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SOME PROBLEMS OF THE RURAL GENERAL PRACTITIONER

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My discussion today is not based on any scientific experiments that I have done, for the rural general practitioner has no time to do these. The conclusions I will present are gathered from my own experiences while doing general practice in a rural area for approximately ten years since graduating from Duke in her first class of 1932.

Selecting a Location

In selecting a suitable place to locate, the rural general practitioner has a world of territory from which to choose. It is extremely important that he make a wise selection, for once he is established, he will find it very difficult and costly to move elsewhere. He must consider carefully the type of people who make up the community in which he is to live and educate his children, and the source from which these people derive their income. Is this income seasonal, as in a farming area, or steady as in an industrial community? Is the population a shifting one made up largely of tenant farmers who move away every year before paying the doctor's bill, or is it a population of home owners who are more responsible? Are hospital facilities, specialists for consultation, and medical centers within reasonable distance? Are the roads such as would not tear up a $1500 automobile in making a $5.00 call?

Learning to Do without Hospital Facilities

One of the greatest problems of the rural general practitioner is learning to get along without the consultations, x-rays, laboratory aids, and other hospital facilities that had been available during his medical training. It is surprising how often these aids can be dispensed with by exercising the skill and judgment which come with experience. Patients can be saved much time and money by not having all the hospital "routine" expenses and the group "consultation" fees forced upon them. Yet the rural general practitioner must be keen enough to recognize the patient who needs more detailed study and refer him to a medical center.

Hospital insurance is no doubt a great boon to the patient, but it becomes a nuisance at times to the rural general practitioner who does not have access to a hospital, or who lives too far away to treat his patients profitably in a hospital. Regardless of how trivial the illness or ailment may be, many patients want to go to the hospital to reap the benefits of this insurance, and they expect the doctor to make the diagnosis grave enough to get them into a hospital.

Prescribing Drugs

Unless the general practitioner is conscientious, his patient's bill at the corner drug store will offset the savings made by eliminating routine diagnostic tests. Patients in rural communities have a strong tendency to evaluate the doctor, not according to his capabilities nor his years of special training, but according to the number of prescriptions he writes for their simple ailments. In the hospital he can prescribe only what the patient needs; in the home he must prescribe what the mother, grandmother, and medical advisers to the family think the patient needs. In the hospital he can order Arm and Hammer soda and aspirin; in the home he

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must write prescriptions for "sodii bicarbonatis" and "acidi acetylsalicylici" and send someone ten miles, perhaps in the middle of the night, to wake the druggist and have the prescription filled. He must do this, that is, if he expects his patient to get soda and aspirin. Did any of you fellow general practitioners ever hear a patient say: "I had Dr. So-and-So the last time, but he didn't do nothing but leave a handful of pills and tell me to take a teaspoonful of soda three times a day"?

Let me mention one of my own mistakes as an illustration. During a deep snow I was called to see a 10-year-old boy who was running a high fever. The father met me with a two-horse wagon to carry me from the highway about a mile to the little farmhouse, where I made a diagnosis of acute rheumatic fever. They had soda. I had aspirin. But I made the mistake of calling it aspirin. When I came back to see the patient two days later, I learned that the mother had not followed my instructions to give him two aspirin tablets every four hours because she knew his heart would not stand it. Since the parents wanted the boy to be in a hospital, he was carried in the wagon through the snow to the highway, transferred to a car, and taken to a hospital twenty miles away—where the doctor ordered three aspirin tablets with soda every four hours. But I was labelled the "aspirin doctor." This experience was a great lesson. I had been taught nothing of this kind in medical school.

Before the days of sulfonamides, I have sat in profound study for minutes beside a child with bronchopneumonia. It takes profound study to write at least three different prescriptions that will do no harm to a very sick child who is perhaps already distended and vomiting and needs only sensible nursing care.

Combatting Medical Superstitions

The rural general practitioner's ingenuity is sometimes severely taxed to see that his patient gets the prescribed medical treatment rather than treatment by old charlatan ideas and superstitions. Most doctors now have repudiated bleeding and purgation as methods of therapy. Most laymen have forgotten the former method, perhaps because they could not carry out the technique nor endure the sight of blood; but with the aid of the radio they have "brushed up" on treatment by purgation.

In hospital treatment the physician is amused by some of the medical superstitions he encounters, but he dismisses them with a nod of the head and treats the patient according to his own dictates. In general practice these old, well established beliefs are not so easily brushed aside. Allow me to mention some of the superstitions which I have encountered in my own experience:

Warm urine instilled into the ear of a child will relieve earache; the juice squeezed from a fat bedbug into the ear canal is also good for this pain. "Sheep-ball tea" is administered to a child to "break out" the measles. Good treatment for a cold is to take a shoe string out of a dirty shoe, tie nine knots in it, and tie the string around the neck. Collard leaves are applied as a poultice to a breast abscess. There is no end to the various kinds of poultices used in pneumonia, colds, and bronchitis. When one walks into a room heated to about 90 F., with every door and window closed and every crack chinked, to find a small child well wrapped in an onion poultice, covered with several thicknesses of flannels, union suits, and blankets, he is amazed sometimes to find that the parents do not want to expose the child by removing this covering even for a brief examination. He is allowed to auscultate a few square inches at the time, covering this area to expose a few more square inches of chest. On one occasion I was called to see a Negro man who had been treated for pneumonia for several days by the family and their medical advisers. Their diagnosis was right. The patient was comatose and dehydrated, with a temperature of 105 F. His entire chest was coated with a snuff-and-kerosene poultice, which had to be scraped off before an examination could be made.

I was once called to see two small children with whooping cough. After spending some time in giving general instructions as to the best care of the children, I began writing a prescription. The father stopped me: "Doc, if it's whooping cough I don't want no medicine. I know what'll cure it." "What's that, Rufus?" I asked. "Mare's milk, and I know where I can get some." The mother, who began crying when she was told that one child also had pneumonia, was comforted by the father, who said: "Shet your mouth, Rosie. If they die you can git you a job in that new

hosiery mill." Yet our State Board of Health is concerned about lack of proper medical attention as a cause for our high infant mortality rate! About two years later, I delivered this same woman of triplets with congenital syphilis.

Only the general practitioner knows how often the burned patient is taken to some old colored woman in the community who has the divine power to "talk the fire out" of the burn. Two or three days later, when the burn is badly infected, the patient is brought in to the doctor. New-born babies are frequently resuscitated by mouth-to-mouth breathing. This is also a widely used cure for thrush. Trench mouth in larger children is often diagnosed as thrush and is treated in this way. I remember in particular one old colored man who could "talk the fire out" of a burn and could also cure the thrush with his breath. This man had a mouth full of badly carious teeth and pyorrhea. Two of his children had active pulmonary tuberculosis. A year ago I treated a child whom he had failed to cure of "thrush." This child had a severe Vincent's infection of the mouth.

I have seen an axe with the blade pointing upward placed under the bed of a woman in labor to "cut the pains." Upon accidentally knocking this over with my foot, I was asked by the woman to set it up again before another pain hit her. This I did with my "sterile" glove on. This incident reminds me that I once asked a general practitioner in Durham if he wore gloves in performing a home delivery. His reply was: "Well, not if I get there in time to take my gloves off first."

Practicing Obstetrics in the Home

Doing obstetrics in the home, which makes up a large proportion of the general practitioner's practice, also has its problems. On one occasion I remember straining the tadpoles out of the spring water before putting it on to boil. One husband wanted his wife to go to the hospital to have her baby because there she could receive penicillin to make her labor easier. The problem of handling toxemia, placenta praevia, and other complications is dependent on the general practitioner's ability to diagnose these conditions early and get the patients into a hospital. Of course, one of these complicated cases occasionally has to be cared for in the home.

Some women will call the doctor, regardless of the time of day or night or the distance, at the first suggestion of a labor pain, because they want the doctor to tell them whether or not they are in labor and just how long it will be before the baby will be born. The doctor is expected to sit by until this event occurs. If he makes an excuse to leave to return later, some woman in the crowd gathered for the occasion will speak up to comfort the patient and doctor by saying: "Dr. So-and-So went off and left me one time, and the baby was born before he got out of sight, and I nearly bled to death. The cord was around the baby's neck twice and he almost strangled." Other patients will have pains for hours and give birth to the baby in bed before even thinking of sending for the doctor.

After practicing in the same community for ten years and attending the same women at several deliveries (some of them as many as ten times), the doctor can develop the knack of getting there just at the right time. I remember that one Sunday I delivered five babies in four counties, went to church in the morning, and took my family on a picnic in the afternoon. Of course, I started early that Sunday and finished late.

Conclusions

I could ramble on and on about my experiences in general practice, but here I have mentioned only a few that linger in my memory. I do not mean to paint a dark picture, for this type of work requires intuition and initiative never dreamed of by the specialist. The rural general practitioner is held in the highest esteem. His advice is often sought in fields remote from the practice of medicine. He is loved and honored by those who have faith in him, and he derives an indescribable pleasure from being able to serve these people—to give them the kind of service that is really needed and appreciated.

Leadership in human relations concerned with health and the control of disease should come from the medical profession. By training and experience and by intimate and sympathetic contact with their fellow men, physicians are close to human problems —the hopes and fears, the traumas and diseases which daily bring so much unhappiness and so much destruction to human life. Because of these qualifications society looks to physicians to direct the search for better methods in the control of disease, and for the building of a more vigorous and healthy population.—Edward L. Bortz: Medical Statesmanship, M. Ann. District of Columbia 16:651 (Dec.) 1947.

THE INTEGRATION OF A PUBLIC HEALTH PROGRAM WITH THE PREVENTIVE ASPECTS OF PRIVATE PRACTICE

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The practice of medicine traditionally has been based on a personal doctor-patient relationship. The value of this relationship has been proved by the accumulated experience of many years. The high standard of medical care which has developed out of it in this country has been thoroughly tested during the recent war and is now recognized the world over. The personal doctor-patient relationship has proved so effective because the diagnosis and therapy of disease must be individualized.

Recent discussions, which sometimes have generated considerable heat, have centered around the allegedly inadequate number of doctors and the poor distribution of medical care. These arguments have neglected an old folk-saying which may be applicable: "An ounce of prevention is worth a pound of cure." An effective program for the *prevention* of disease would increase the efficiency of the practicing physician, make his life more pleasant, and give him the *time* which he needs to provide better care for his patients.

Most disease is an individual problem, but some diseases, because of their mode of transmission, may be better considered with the family as the unit rather than the single patient. Other diseases must be considered at the level of the community, since their control is beyond the scope of the physician in private practice. The control of such diseases usually requires special training on the part of physicians charged with their prevention; legal backing is essential to enforce the necessary measures. These requirements have been recognized for years and have been excellently met by public health departments.

The Present Role of Public Health Agencies

At the community level

The control of water supplies, sewage disposal, and the handling of food are generally accepted as fields of activity for a public health department. The control of milk is an excellent example of the careful supervision of food. The supervision extends to the source, with tuberculin testing of the cow and inspection of the dairy. The milk is followed through the process of pasteurization and bottling, and its distribution to the ultimate consumer by the store, delivery truck, or waitress in a restaurant is supervised. The meticulous application of the principles of disease control by such techniques has resulted in a phenomenal reduction in the incidence of typhoid fever and other enteric infections. The increase in the average life span over the past two generations has resulted largely from the reduction in infant and child mortality from food- and waterborne diarrheal infections.

The control of vectors of disease—especially the arthropods such as mosquitoes, ticks, flies, lice, and fleas—and of the animal reservoirs of disease—rats, rabbits, and dogs—is accepted as part of the field of public health. Such diseases as malaria and endemic typhus have been eradicated in some communities by the application of proper measures.

In more recent years industrial hazards have been included in the scope of a public health program. The recognition of the problem and the correction of the industrial technique or process at fault have reduced the incidence of occupational diseases. Silicosis is a good example.

At the family level

The control of disease in which the community has an interest through the public health authorities overlaps the field where the family is the unit. The science of genetics can be applied to the control of diseases which are transmitted hereditarily. North Carolina has led in a far-reaching program of sterilization and contraceptive advice in this field, though in recent years we have not applied our existing laws as fully as we might have. Congenital infections, notably syphilis, are diseases in which the community has an interest, since the infected child may later become a public charge; by enforcing the proper treatment of syphilis during pregnancy, the community will be saved from having to support the victim of congenital syphilis in a psychiatric institution for many years later in life. The control of other infections, such as tuberculosis, fre-

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quently is beyond the economic means of a family. The community is interested not only in isolating the infected individual and preventing new infections in the remainder of the population, but also in treating the patient so that he may quickly become self-supporting again. Since the cost of treatment for this infection extends over months or years, the community has accepted a financial responsibility for tuberculous patients.

Psychiatric disturbances have been recognized as a problem for the community. The cost of custodial care and therapy is frequently beyond the means of a single family. The techniques necessary for proper care or for therapy are beyond the facilities and knowledge of the family and, frequently, of the family physician. The public agencies should attempt to prevent the development of similar diseases in other members of the family and to restore the affected individual as quickly as possible to a self-supporting status.

In more recent years ordinary physiologic processes—such as pregnancy—have been included in public health programs. Maternal and child welfare projects have received increasing financial support.

At the level of the individual

A public health program overlaps the work of the private physician at the level of the individual, as well as at the family level. A single patient with an infectious disease may possibly expose the community to an epidemic. The public health authorities are charged with determining the magnitude of the problem, isolating the infected individual, and tracing contacts and carriers. These measures are beyond the jurisdiction of the family physician, since he has no legal authority to enforce isolation or the examination of contacts.

When disease is spread by personal contact of individuals, therapy as well as detection and isolation has been included in the field of public health; adequate early treatment will reduce the number of contacts and also the number of serious late complications for which the community may have to provide. This principle is most clearly illustrated by the compulsory venereal disease treatment programs.

The immunization of individuals against the acute infectious diseases—such as smallpox, diphtheria, typhoid, and whooping cough—is of paramount importance in the field of public health. North Carolina has taken the lead in a forward-looking program of compulsory immunization of preschool children. The public health authorities prepare the materials for immunization, furnish them to the family physician for use on his patients, and actually perform the procedure for those persons who, because of their economic status, hesitate to seek the services of a private physician.

The Future Role of Public Health

In the past the advances in preventive medicine have been made chiefly in the control of the infectious diseases of childhood and early adult life. Because of the effectiveness of this program people are living to an older age, and the degenerative diseases (such as the disturbances of the cardiovascular system) and cancer have replaced the infectious diseases as the most frequent causes of death. The emphasis in a public health program for prevention of disease must change with the alteration in the causes of death. The old programs which have proved so effective must not be discarded, but should be revised in the light of new knowledge.

To demonstrate the way in which the thinking of individual physicians can be applied to the prevention of disease, the last graduating class at the Bowman Gray School of Medicine was asked to discuss the preventive aspects of some case they had seen on the wards of the North Carolina Baptist Hospital, as part of their final examination in preventive medicine. Twenty of the thirty-eight students discussed problems falling within the field of internal medicine. Surprisingly enough, however, almost half the students (eighteen) discussed cases in other fields—obstetrics, surgery, urology, psychiatry, and even otolaryngology. Twenty-two of the thirty-eight cases discussed were infections—a reflection of the proved effectiveness of preventive medical programs in infectious disease. A number of students, however, discussed cases of neoplasms, developmental abnormalities, and metabolic and functional diseases. Only thirteen of the thirty-eight answers concerned diseases which are generally accepted as the responsibility of the community as a whole. The other two thirds were cases which should be

approached at the level of the family or of the individual—the field of the family doctor and the private practitioner of medicine. This demonstration of the progressive thinking of medical students, in the light of the changing character of the diseases which cause death, indicates that control of community, family, and individual problems in disease should be more closely integrated.

Extension of the present program for control of infections

The beta hemolytic streptococcus is extremely important in the production of nephritis and rheumatic fever; recurrent streptococcal infections result all too frequently in far-advanced lesions. Up to the present, however, no effective means has been devised for the control of respiratory infections; methods which have proved effective for enteric bacteria are not applicable.

During World War II considerable research was done on preventing the transmission of respiratory infections in public places. The aerosols of propylene glycol and triethylene glycol are effective in reducing the number of respiratory organisms in the air. These agents in the vapor phase are active in concentrations as low as 1:300,000,000 parts of air. It is possible to adapt the techniques of glycol vapor dispersal to air conditioning systems in public places. The control of pyogenic organisms from the respiratory tract by the oiling of blankets, draperies, carpets, and floors—a technique developed in surgical wards—could be applied to hotels and other public living places.

Immunization against influenza viruses A and B with the new chick-egg vaccine gives promise of reducing the severity and frequency of severe respiratory infections.

Furnishing of services for the private practitioner

The new North Carolina medical care program passed by the last legislature provides for the establishment of health centers which will include the local public health agency. Again North Carolina has the opportunity to blaze a new trail and to assume leadership in advances in disease control. The public health agencies should furnish laboratory services which are beyond the facilities of the private physician or small hospital. The unavailability of properly performed laboratory diagnostic procedures is a well-recognized defect in our present distribution of medical care.

Programs to confirm the diagnosis of a *suspected disease*, such as serologic testing for syphilis and the examination of sputum for acid-fast organisms, might be expanded and decentralized. Some surveys have shown that 3 out of 100 random samples of sputum from patients with chronic productive cough will be found positive for acid-fast organisms. In North Carolina 14 per cent of 8680 specimens examined during 1946 were positive; most of the specimens were from persons upon whom the diagnosis of tuberculosis had already been made. A wider search for cases of tuberculosis in which the differential diagnosis cannot be made by the x-ray alone would seem worth while. In a recent North Carolina survey 3 per cent of the chest films showed x-ray changes which justified intensive study.

Such useful new techniques as the vaginal smear stained by the Papanicolaou technique could be made more widely available for the detection of genital carcinoma in the female. From time to time new methods will be developed which could properly be added to the services of a diagnostic laboratory.

The use of diagnostic facilities for the detection of *unsuspected disease* could be expanded. Case-finding surveys by routine serologic testing and routine x-raying of the chest are being performed. Such programs must not be carried out once as a dramatic demonstration, but must be frequently and regularly repeated. The services of a psychologist in each local school system would be useful in the detection of early mental abnormalities. During this stage a psychiatric disturbance might be reversible, but after it has continued for years correction is often impossible. A mentally defective child left in the home and in regular school classes may precipitate serious disturbances in other children which could be prevented.

Laboratory services for the *control of therapy* should be available. The figures cited above indicate that physicians in North Carolina are properly using facilities for sputum examination to detect acid-fast organisms. The development of new and highly specific chemotherapeutic agents focuses attention on the great need for adequate bacteriologic cultural studies. At present chemotherapy is based on trial and error. Since time is of

the greatest importance in the treatment of acute infectious diseases, however, the selection of the proper drug on the basis of bacteriologic studies would greatly improve the efficacy of treatment. The technical difficulty of keeping media fresh while studying a small number of bacteriologic cultures makes it difficult for physicians to have this service adequately performed at present.

Expansion of health education programs

The current shortage of nurses has greatly handicapped the work of the practicing physician. During the war it was learned that by new techniques in education intelligent laymen could be trained in the care of sick people much more quickly than was formerly thought possible. For instance, nurses' aides were trained within a period of weeks to perform satisfactorily most of the duties of graduate nurses in general community hospitals. Could a public health department, in cooperation with the practicing physicians, utilize such teaching techniques to educate the community better to understand disease and how to cope with it?

Health education of children could be started in the grammar grades with simple biologic demonstrations, and continued with a carefully graduated curriculum through the high school to include adequate premarital instruction. The present attitude that premarital instruction should be given only in colleges does not squarely face the facts. Only 30 per cent of children who enter the first grade in North Carolina graduate from high school, and only 25 per cent of these go to college. The period of compulsory attendance has recently been raised from 14 to 16 years, so that more pupils may be expected to graduate from high school. The number of children borne by girls of high-school age is considerable. In the first three months of 1947, 2253 babies were born to girls 18 years of age or under; this number was 10 per cent of the total number of deliveries in North Carolina.

The general principles of disease could be adequately covered in the schools. Included in the discussions of infectious diseases should be information on the modes of transmission of the venereal diseases. In 1946, 19.7 per cent of all venereal diseases reported in North Carolina were in children 18 years old or under. The health education program in the schools should encourage children to go to their family physician for more detailed and individualized instruction on the basis of their personal situations and needs. Programs of education by special health educators trained in the School of Public Health at the University of North Carolina have already proved in communities like Winston-Salem the feasibility of such a plan.

The education of school children is not enough. The *education of adults* could be conducted by the practicing physicians of a community in courses sponsored by the public health authorities. Community discussions would be more effective if the family doctors participated in them than if they were conducted by the health department alone. A continuing program of adult education in general principles of disease and in specific problems could be carried on throughout the years at the health centers.

The community and family problems in disease which could be explained by such techniques are numerous and obvious. Community education could be profitably carried further—to the level of the individual. A discussion of nutrition should include not only deficiency diseases, which will reflect in the entire family the meals poorly planned by the mother, but should also bring out the dangers of over-nutrition. The increased susceptibility of obese individuals to hypertension and diabetes could be stressed, and the dietary measures to prevent their development could be outlined. The nutritional principles to be followed during pregnancy to prevent the development of toxemia could be taught in general courses, as well as in the prenatal clinic. Mothers could be shown that the preparation of infant formulas and the proper care of foods for children are not rituals to be blindly followed, but are measures to prevent diarrheal diseases, as well as rickets, scurvy, and other nutritional deficiencies.

Community-wide education would result in more intelligent and effective *home nursing*. The efficiency of nurses' aides during the emergency of the war has demonstrated how effective such a program could be if carried back into the home. Imagine the effect on the community if courses of home nursing at the professional level of the nurses' aide were continued for a genera-

tion. The better observation of the early symptoms and signs of an illness would help the family physician to make an accurate diagnosis on his first visit. The more intelligent execution of orders would result in better application of therapy. The time required of the doctor would be decreased. Prevention of the transmission of infections to other children or adults—and hence back to the school or factory—would result in less total illness in the community.

The custodial care of patients with degenerative diseases is not now considered to be a problem of the community, unless a psychiatric disturbance is present. Elderly patients with such diseases are now poorly cared for in the home. An adequate program of home nursing would greatly reduce the requirements for medical care at the level of the physician. Needless duplication of effort on the part of physicians, brought about by the "shopping around" of patients with hopeless conditions—such as those resulting from strokes—could be largely eliminated. Any well trained family doctor can adequately handle such problems, but failure to understand the nature of the underlying disease process sends the patient and his family from clinic to clinic and from doctor to doctor. If the same amount of the doctor's time were distributed among patients who could be helped, the remainder of the community could be given better medical care. By the same line of reasoning, reassurance of the psychoneurotic patient by his own family physician would be much more effective if the patient and his family had a better understanding of the psychoneuroses; correction of the public's ignorance on this subject would prevent much useless waste of the doctor's time.

These measures could be accomplished only by a long-range program of health education vigorously pursued over a period of fifteen to twenty years. This would require effective cooperation between the practicing physicians in the community and the public health department. The wide dissemination of medical knowledge thus accomplished would result in the goal all physicians seek—improvement in the health of *all* the people.

Summary

Disease may be controlled at the level of the community, of the family, or of the individual. The present effective programs for the prevention of infectious diseases should be continued and should be constantly revised as new techniques are developed.

The increasing importance of the degenerative and neoplastic diseases as causes of death indicates the need for a revision of emphasis in the public health program.

Public health agencies should extend the laboratory services available to physicians for the diagnosis of disease and the control of therapy where local facilities are inadequate.

A graduated program of health education, starting in the grammar school, continuing through high school, and including the adult population of the community, would greatly increase the effectiveness of the doctor's time.

A closer integration of the activities of the family physician and the public health agencies will result in better health for the people.

The statistics quoted in this article were supplied by Dr. C. P. Stevick, collaborating epidemiologist and acting director, Division of Vital Statistics, North Carolina State Board of Health; Dr. John H. Hamilton, director, State Laboratory of Hygiene; and Clyde A. Erwin, state superintendent of public instruction.

The Secret of Good Public Relations—The principal quality that distinguishes the successful from the less successful doctor of medicine is not as would be supposed, clinical knowledge, but interest in the patient. This interest reflects itself as concern with the immediate medical problem as well as the general social problems of the patient who presents himself.

It is a flaw in our present system of education of medical students and interns that we stress what they can obtain from the patient in knowledge as to diagnosis and treatment and fail to inculcate a feeling as to what the doctor can give to the patient. Yet the patient who pays the fee comes to his doctor to obtain a service that cannot be divorced from a strong feeling of interest in the person.

This is not to decry the importance of thorough training, the grasp of fundamentals which are necessary for proper treatment and diagnosis. Many doctors are superbly equipped with this clinical facility yet cannot understand why patients pass their door to go to the office of one less well equipped. As long as we have free choice of physician (and God grant this American right will prevail as long as our current system of government) the patient is going to seek the services of the physician who is most interested in him.

All of us are guilty of erring in lack of sufficient interest in our patients to some degree. Political medicine would foster this defect. Wherever political medicine has been tried, this lack of interest on the part of the physician has been the principal objection the patient has made to the system.

Every doctor is interested in his patients, too many of us are guilty of failure to show it.—Editorial by Ralph A. Johnson in Detroit Medical News, quoted in the Ohio State Medical Journal 43:1270 (Dec.) 1947.

THE EARLY DIAGNOSIS OF UTERINE MALIGNANCY

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During 1946 approximately 181,000 people in the United States died from cancer. About 20 per cent of this number, or 36,200, died of cancer of the uterus. In North Carolina during 1946 there were approximately 2,500 deaths from cancer, and about 500 women died of cancer of the uterus. The annual death rate from cancer has continued to rise since 1900. It is now exceeded only by heart disease as a cause of death. Many factors may be responsible for this rise. Chief among these are the facts that more cases of cancer are being recognized and that the life expectancy of our population has been increased. The number of people who live past 45 to reach the "cancer age" is almost three times as great now as in 1900. Whatever the cause of the increased death rate from cancer, however, it behooves us to reduce it as much as possible.

If we are to cure cancer and reduce the mortality rate, we must diagnose cancer early and institute adequate treatment immediately. Early diagnosis of uterine cancer will be accomplished in three ways: (1) education of the public in the early signs of cancer; (2) education of the profession to *examine* women presenting themselves with irregular or abnormal menstrual bleeding, especially after the menopause; and (3) periodic pelvic examinations.

Many uterine cancers could be prevented by periodic pelvic examinations and good postpartum care. It is the duty of the physician attending any obstetric patient to see that patient six to eight weeks *post partum*, do a pelvic examination, and correct any abnormalities present. The use of the nasal-tip cautery to treat the cervical erosions so frequently seen will prevent many cases of cancer of the cervix.

Cancer of the uterus is not difficult to diagnose, and the primary symptom—irregular vaginal bleeding—is known to most physicians and to most laymen. The American Cancer Society is doing an excellent job in educating the women of America to recognize the early symptoms of cancer of the uterus. Why then do we see so many late cases of uterine cancer? There are two primary reasons: (1) failure of the patient to consult a physician when the known symptoms of cancer first appear, and (2) failure of the physician to pay proper attention to these symptoms when the patients present themselves. Too often a patient with irregular menstrual bleeding is told by her physician that her symptoms are due to the change of life and that no examination is necessary. *All cases of irregular vaginal bleeding must be considered as due to a malignancy until they are proven otherwise.* The physician must come to realize his responsibility in preventing deaths from cancer.

Factors Predisposing to Uterine Malignancy

In the female the uterus is the most frequent site for the development of cancer. About 25 per cent of all cancers in women are of uterine origin. This fact is not surprising, since trauma and irritation are known to be factors in the development of malignancy, and since childbirth necessarily results in trauma to the cervix. The fact that a woman has not borne children, however, does not make her immune from cervical cancer. Ten per cent of all cervical malignancies occur in nulliparous women.

The cervix is a most unusual organ histologically. In a space of one and a half inches there exist three distinct types of epithelium—squamous, columnar, and cuboidal. Nowhere else in the body does such a condition exist. The most frequent site for the development of cervical cancer is the junction of the squamous and columnar epithelium, which is situated at the outer edge of the external os. This area is the site of much trauma in childbirth and much irritation from the vaginal secretion. The hydrogen-ion concentration of the vagina changes with each menstrual period, and with many diseases. This change may be a factor in producing irritation and malignant changes in the epithelium of the cervix. Hypertrophy of the columnar epithelium resulting in cervical erosion is a frequent gynecologic finding. Cervical cancer is apt to develop in these eroded areas.

The epithelium of the corpus is not subject

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to as much trauma and irritation as is that of the cervix. Neither is cancer of the corpus as frequent as cancer of the cervix. The lining of the corpus, however, is subject to constant progressive and regressive changes, and malignancies do develop in this area. The corpus is very frequently the site of a benign new growth in the muscle tissue—fibromyoma. When a fibromyoma is found in a patient with abnormal bleeding, the tendency is to cease to look for malignancy. Adair[1], however, found that 2 per cent of the uteri removed because of fibromyoma contained a complicating cancer of the corpus. Thirty-eight per cent of the uteri removed for cancer of the corpus contained a fibromyoma. It is thus apparent that every uterus removed at operation should be opened and inspected for malignancy immediately after its removel.

The fact that a woman has had her uterus removed may give her a false sense of security as to the development of cancer. In about 2 per cent of the patients who have had a supravaginal hysterectomy, however, cancer of the cervical stump develops later. Thus, when the patient's condition warrants it and the operator is capable, panhysterectomy is preferable to subtotal hysterectomy. If it is necessary to perform a supravaginal hysterectomy on a patient with a diseased cervix, appropriate treatment should certainly be given for the cervical disease.

Methods of Diagnosis

Cancer of the cervix offers no particular problem in early diagnosis. It is favorably situated to allow visualization, palpation, and biopsy. The removal of a biopsy specimen from the cervix is usually an office procedure. The cervix is relatively insensitive to pain and no anesthesia is required. Schiller's test is of value in locating the area from which to take a biopsy: When a solution of iodine is applied to the cervix, the normal tissue will stain a deep brown; areas of leukoplakia, injury, and cancer do not take the stain well because of a lack of glycogen in the cells. It is important that an adequate specimen be obtained for biopsy. The specimen may be taken with a cutting current or with any of the various biopsy forceps.

Cancer of the corpus is somewhat more difficult to diagnose early because the interior of the uterus is not easily visualized. Early diagnosis is dependent upon a careful history and painstaking pelvic and speculum examinations, followed by pathologic examination of the epithelium of the endocervix and of the endometrium. It may be necessary at times to bisect the cervix to get to an endocervical growth. Biopsy of the endometrium entails careful curettage of the entire uterus and pathologic examination of *all* material removed by the curette. This is usually a hospital procedure.

Clark's sign (bleeding resulting from the passage of a uterine sound into the endocervix or corpus) is of value in the diagnosis of carcinoma of the endocervix and fundus.

The Papanicolaou method

Papanicolaou[2] in 1943 evolved a procedure which has added greatly to our armamentarium for the early diagnosis of uterine malignancy. His method is based upon the fact that carcinomas of the cervix and corpus are desquamative lesions; the cells are discharged either singly or in clumps in the vagina, and may be recovered from the vaginal or cervical secretions. The diagnosis of malignancy is based primarily on changes in the nuclei of the desquamated cells. The nuclei are much larger; they stain much deeper, and may show nuclear division. Special stains have been developed by Papanicolaou for staining these cells. The staining and interpretation of these slides should not be attempted by anyone but a trained cytologist. Interpretation is not for the novice.

The technique for the preparation of the slides, which has been modified somewhat by Ayre[3], is very simple. A complete description of the procedure is given in the original article of the authors[2]. Briefly, it is as follows: A speculum without lubricant is introduced into the vagina. The cervical and vaginal mucus is aspirated by suction with a bulb syringe. It is then transferred to a glass slide, fixed in 95 per cent alcohol, and stained according to the technique of the author. Ayre[4] uses a spatula for remov-

1. Adair, F. L.: How May the General Practitioner Diagnose Cancer of the Uterus, New England J. Med. 224:497-501 (March 20) 1941.
2. Papanicolaou, G. N. and Traut, H. F.: Diagnosis of Uterine Cancer by the Vaginal Smear, New York, The Commonwealth Fund, 1943.
3. Ayre, J. E.: Selective Cytology Smear for Diagnosis of Cancer, Am. J. Obst. & Gynec. 53:609-617 (April) 1947.
4. Ayre, J. E. and Dakin, E.: Cervical Cytology Tests in Cancer Diagnosis; Glycerine Technique for Mailing, Canad. M. A. J. 54:489-491 (May) 1946.

ing the desquamated cells from the squamocolumnar junction of the cervix or from any suspicious area which might be present.

Ayre[4] has also devised a method for preserving and mailing the specimen. After the slide is prepared in the usual manner a drop of glycerine is placed over the material on the slide, and it is covered with a second slide. The slide may then be mailed to a laboratory for interpretation without the cells' undergoing degenerative changes.

This test has proven correct in about 90 per cent of the cases in which it has been employed. It lends itself to wide use in cancer detection clinics and private practice. It may contribute as much to the diagnosis of malignant disease as the Wassermann test did to the diagnosis of syphilis, and each state may maintain a central laboratory for the interpretation of slides.

Summary

Since trauma and irritation are the most important factors in the production of malignancy, many uterine cancers could be prevented by periodic pelvic examinations and adequate postpartum care, with correction of any abnormalities present.

All cases of irregular vaginal bleeding must be considered as due to a malignancy until they are proven otherwise.

A careful history and physical examination, together with a biopsy, are essential for early diagnosis of uterine malignancy.

The Papanicolaou method is a valuable addition to our armamentarium for the early diagnosis of uterine cancer.

Discussion

Dr. Frank R. Lock (Winston-Salem): The early diagnosis of malignancy is essential if we are to get good results from treatment. In spite of the widespread public campaign for education of the laity, a prolonged delay occurs between the first signs and symptoms of cancer and its diagnosis in the average case. Every article dealing with pelvic malignancy emphasizes this point. In a series of patients with adenocarcinoma of the endometrium treated at the University of Michigan, Dr. Norman Miller determined that symptoms had been present for an average of eleven months before the diagnosis was made. Our experience in Winston-Salem is similar to this.

We have only recently appreciated the asymptomatic character of early pelvic malignancy. The usual symptoms are evidence of advanced disease. The present trend is toward the diagnosis of cervical malignancy in the pre-invasive phase of the disease. At this time and during the early invasive stage, no characteristic lesion is present.

A cytologic laboratory has not been available to us because we have not had trained technicians. We have adopted a policy of making a routine biopsy of any cervix that is sufficiently diseased to suggest the need for treatment. Almost 1400 cervical biopsies have been performed, and 141 cervical cancers have been discovered. At least 15 of the malignancies were not suspected, and were found in young women who had cervical disease typical of a benign lesion.

We cannot make a strong enough plea for careful routine inspection of the cervix and for the frequent use of biopsy. Obtaining material for a cervical biopsy is a simple procedure. The only equipment required is a simple biopsy punch, or the material may be taken with an electric surgical unit if the physician has one. The specimen is taken in the office without difficulty, and with no appreciable discomfort to the patient.

The vaginal smear technique is a splendid development in the field of gynecology. It is going to mean much to us, but until we have dependable cytologic laboratories generally available, each of us must own a biopsy punch or other equipment for obtaining a biopsy specimen, and use it frequently.

THE USE OF VAGINAL SMEARS IN THE DIAGNOSIS OF GENITAL CANCER

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DURHAM

Cancer can be cured. To be cured, it must be diagnosed in its early stages.

In 1944 there were 171,171 deaths from cancer in the United States. Of these, 89,005 occurred in women. Twenty-two thousand one hundred and forty deaths were due to cancer of the genital tract. Because of this preponderance of genital malignancy in women we began the use of the vaginal smear as an aid in the early diagnosis of this disease.

The clinical use of vaginal smears dates back to 1847, when Pouchet[1] examined dry and unstained vaginal secretions in studying the human sex cycle. In 1917, Papanicolaou and Stockard reported the use of stained vaginal smears in demonstrating the

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*Trainee, National Cancer Institute.

1. Pouchet, F. A.: Theorie positive de l'ovulation spontanee et de la fecondation des mamiferes et de l'espece humaine, basee sur l'observation de toute la serie animale, Paris, J.-B. Bailliere, 1847.

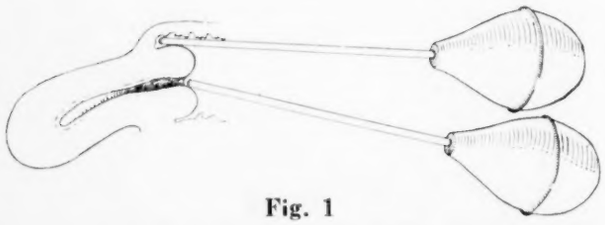

Fig. 1

estrous cycle in the guinea pig[2]. Continuing this type of work in studying the human menstrual cycle, Papanicolaou noted the appearance of bizarre cells which he recognized as exfoliated cancer cells. This finding was reported in 1928[3]. Because of the indifference of clinicians to this report, and because of Papanicolaou's increasing interest in the effect of hormones on vaginal epithelium[4], twelve years passed before he again reported on vaginal smears in relation to uterine cancer. With Traut as co-author, the epoch-making monograph on the diagnosis of uterine cancer by the vaginal smear was published in 1943[5]. Since then, several writers[6] have confirmed the observations set forth in that monograph.

Technique for Obtaining and Staining Smears

The technique for obtaining vaginal smears is quite simple. We employ a rubber bulb and glass pipette in obtaining the secretions for the smears. At least two types of smears, one vaginal and one cervical, are made on all patients over 30 years of age who come to our obstetric and gynecologic clinics. Neither of the two should be omitted. If the original smears are suggestive of endocervical or intrauterine cancer, a third type of smear is employed. This is the endocervical or endometrial smear.

2. Stockard, C. R. and Papanicolaou, G. N.: The Existence of a Typical Estrous Cycle in the Guinea Pig, with a Study of Its Histological and Psychological Changes. Am. J. Anat. 22:225 (Sept.) 1917.
3. Papanicolaou, G. N.: New Cancer Diagnosis, in Proceedings of Race Betterment Conference, 1928, p. 528.
4. Papanicolaou, G. N.: The Sexual Cycle in the Human Female as Revealed by Vaginal Smears. Am. J. Anat. (supp.) 52:519-637 (May) 1933.
5. Papanicolaou, G. N. and Traut, H. F.: Diagnosis of Uterine Cancer by the Vaginal Smear, New York, Commonwealth Fund, 1943.
6. (a) Meigs, J. V. et al.: Value of the Vaginal Smear in the Diagnosis of Uterine Cancer, Surg., Gynec. & Obst. 77: 449-461 (Nov.) 1943; (b) Fremont-Smith, M., Graham, R. M., Janzen, L. T., and Meigs, J. V.: The Vaginal Smear in the Diagnosis of Uterine Cancer, J. Clin. Endocrinol. 5:40-41 (Jan.) 1945; (c) Meigs, J. V., et al.: The Value of the Vaginal Smear in the Diagnosis of Uterine Cancer: A Report of 1,015 Cases, Surg., Gynec. & Obst. 81:337-345 (Oct.) 1945; (d) Jones, C. A., Neustaedter, T., and Mackenzie, L. L.: The Value of Vaginal Smears in the Diagnosis of Early Malignancy, Am. J. Obst. & Gynec. 49:159-168 (Feb.) 1945; (e) Ayre, J. E.: A Simple Office Test for Uterine Cancer Diagnosis, Canad. M.A.J. 51:17-22 (July) 1944; (f) Ayre, J. E., Bauld, W. A. G., and Kearns, P. J.: Test to Show Value of Cervical Cytology Smear in Uterine Cancer Diagnosis, Am. J. Obst. & Gynec. 50:102-105 (July) 1945.

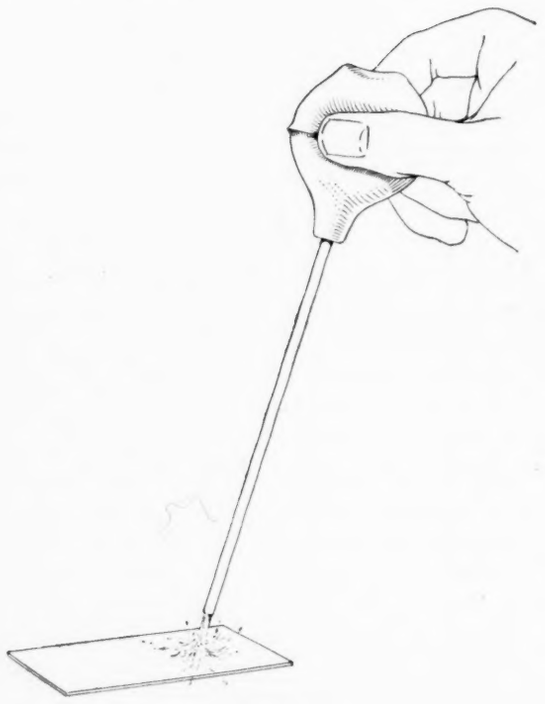

Fig. 2

The *vaginal* smear is obtained first by introducing a glass pipette (16 cm. long and 5 mm. in diameter) into the posterior fornix of the vagina (fig. 1). The vulva is spread with the left hand. As the pipette is withdrawn, the secretions are aspirated into it. The contents are blown on a glass slide (fig. 2) and spread thinly (about the thickness of a blood smear) with the side of the pipette (fig. 3). The *cervical* smear is obtained after the speculum, without lubricant, is inserted into the vagina. The pipette is placed first in the cervical os for the aspiration of secretions, and is then applied to the surface of any suspicious-appearing lesion.

When the smears are made, the slides are placed immediately in a fixative composed of equal parts of 95 per cent alcohol and ethyl ether. The slides should remain in the

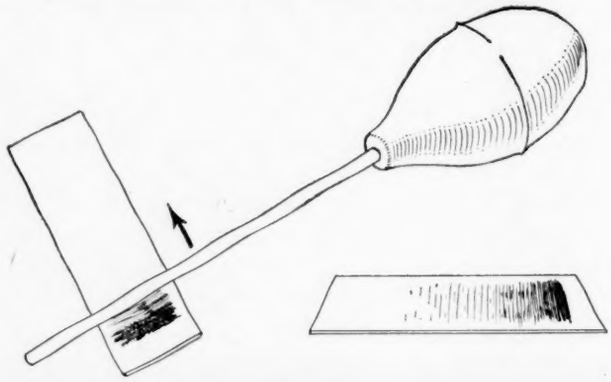

Fig. 3

alcohol-ether fixative for ten to twenty minutes in order to obtain proper nuclear fixation. They may stand for a week or ten days without deterioration.

The staining procedure, in which some twenty-five to thirty steps are required, is exacting and consists of hydration, nuclear staining, counterstaining, dehydration, and mounting. After hydration the smears are stained in Harris' hematoxylin, later in orange G, and still later in Papanicolaou's triple counterstain composed of yellowish eosin, light green, and Bismarck brown. After dehydration the smears are passed through xylol and then mounted in any one of the popular mounting media.

Thoroughly fixed smears may be stored or mailed if the smear is coated with glycerin and covered with a second slide[7]. Prior to staining, such smears must be treated for approximately an hour in absolute alcohol to dissolve the glycerin. This procedure does not modify the staining technique, and the cellular detail is unchanged in correctly preserved smears.

Because of the high percentage of failure in diagnosing adenocarcinoma of the endometrium by vaginal smears, Papanicolaou and Marchetti devised a technique for obtaining endocervical or endometrial smears[8]. For this they used a metal catheter (endotracheal) with a Luer-Lok syringe attached for aspirating secretions from the endocervix and uterine cavity. We have used this technique with very satisfactory results on most of our patients whose original smears were strongly suggestive of uterine cancer.

Ayre devised a notched wooden spatula for obtaining cervical smears[9]. With a rotary motion of the instrument he actually scrapes the endocervix and cervical lips. His published results are the best so far reported from the standpoint of percentage of error.

Interpretation

Whereas the technique for obtaining vaginal smears is comparatively simple, the interpretation of the smear necessitates long study and much experience. One must be familiar with all the normal surface cells of the genital and urinary tracts, and with all the corresponding inflammatory elements, since it is possible for any of them to be exfoliated into the vaginal cesspool.

The diagnosis of cancer by the vaginal-smear technique is much more difficult than the interpretation of the changes occurring in the vaginal smears during the menstrual cycle. The latter might be compared to the differential white-cell count, the former to a bone-marrow smear.

Classification

For classification in regard to possible malignancies, the epithelial elements in the vaginal smears are divided into five types.

Type I—All epithelial cells are essentially normal.

Type II—Some cells are atypical in cytoplasmic or nuclear details (or both), but no cancer cells are present.

Type III—Cells are present which are strongly suggestive of cancer but upon which a definite diagnosis of malignancy can not be made.

Type IV—Malignant cells are present, but are few in number or of few kinds (or both).

Type V—Many cancer cells are present, often of many kinds.

Types of normal vaginal cells

The normal epithelial cells seen in vaginal smears are divided into subtypes. These subtypes are based in general upon the effects of varying degrees of estrogenic activity. Characteristic changes occur in the vaginal epithelium during the menstrual cycle, after the menopause, before the menarche, in secondary amenorrhea, and during pregnancy.

Basically, there are three types of vaginal cells. These are (1) basal, (2) intermediate, and (3) superficial. With the elevation of blood estrogen there is a shift to the superficial type of cells. When, however, the blood estrogen falls to a sufficiently low level, the shift is to the basal type of cells.

Papanicolaou[4] divides the normal menstrual cycle into four phases: (1) menstrual (first through the sixth day), (2) follicular (seventh through the thirteenth day), (3) regressive (fourteenth through the seventeenth day), (4) premenstrual (eighteenth through the twenty-eighth day). During a normal menstrual cycle, it is the superficial cell which depicts the changes in the vaginal epithelium characteristic of the phase. Therefore, in the immediately following para-

7. Ayre, J. E. and Dakin, E.: Cervical Cytology Tests in Cancer Diagnosis: Glycerine Technique for Mailing. Canad. M.A.J. 54:489-491 (May) 1946.
8. Papanicolaou, G. N. and Marchetti, A. A.: The Use of Endocervical and Endometrial Smears in the Diagnosis of Cancer and of Other Conditions of the Uterus. Am. J. Obst. & Gynec. 46:421-422 (Sept.) 1943.
9. Ayre, J. E.: Personal communication.

graphs, it is the superficial cell which is described.

The follicular phase in general is characterized by deeply pink-stained vaginal cells. They have small pyknotic nuclei, abundant cytoplasm, and numerous cytoplasmic granules. A relative leukopenia prevails, and mucus, often in copious amounts, may be found during the first few days of this phase. The cells are usually separated from each other. Various degrees of cornification may be found.

The regressive phase begins the day after ovulation. One of the first signs of this phase is the rolling of cell edges. There is slight clumping. The cells begin to lose their cytoplasmic granules, and an occasional inflammatory cell is apparent. In general leukocytes are not present in large numbers in the regressive phase.

In the premenstrual phase there is a distinct change in the vaginal cells. The cells become less distinct in outline. They may be folded or have rolled edges. There is a predominance of basophilic over acidophilic cells. The nuclei are larger and there is a tendency for the cells to be exfoliated in large, dense clumps. The amount of mucus is decreased and the number of free nuclei and polymorphonuclear leukocytes is increased.

During the early menstrual phase, the smear is similar to that of the premenstrual phase except for the presence of red blood cells. As menstruation progresses, many macrophages, single acidophilic cells, and clumps of endometrium appear throughout the bloody smear.

Generally speaking, estrogenic activity wanes during the climacteric. There is a phase during the climacteric when estrogenic stimulation is no longer sufficient to result in periodic uterine bleeding, but may produce a certain degree of cornification of the vaginal epithelium. During this phase—termed "crowded menopause" by Papanicolaou—the cast-off cells are principally of the superficial and intermediate types, but are atypical in shape. The clumps have a purplish hue in the central portion of the mass. The individual cells stain lighter than those of the premenstrual phase, but resemble them very closely. There usually is a scattering of basal cells in the "crowded-menopause" smear.

The "crowded-menopause" phase is followed by one in which the estrogenic stimulation is insufficient to cause progressive changes in the basal cells of the vaginal epithelium. The vaginal epithelium of this phase is quite similar to that seen before the menarche. There is a predominance of basal cells, and many polymorphonuclear leukocytes are present. The cells are oval or cartwheel in shape and are basophilic in reaction. The nuclei are large and may be eccentric in position. Few cytoplasmic granules are present. These cells are not exfoliated in clumps. Frequently they are highly acidophilic without any other evidence of estrogenic activity.

Alterations produced by non-malignant conditions

The characteristics of the normal phases of the vaginal epithelium are greatly altered by infection, pregnancy, abortion, estrogen therapy, or an intrinsic hyperestrogenic state.

Infections produce an abundance of leukocytes and many phagocytes. Red blood cells appear in varying numbers. The vaginal cells are atypical in regard to color and nuclear and cytoplasmic changes.

In vaginitis due to Trichomonas vaginalis, triangular, sharp-angled cells with deep orange-red coloration and light perinuclear halos are characteristic. The nuclei are small, pyknotic, and irregular in outline. Many free nuclei and much intracellular bacterial debris are seen. Very frequently the protozoa are present. If they are not visualized the abnormal findings are attributed, for the time being, to a non-specific infection.

In cervicitis a marked variation in the vaginal cells occurs. The cells are atypical in staining qualities, in shape, and in nuclear regularity. There is an abundance of polymorphonuclear leukocytes, phagocytes, and not infrequently red blood cells. The cervical cells are exfoliated in abundance. Many of them are normal in appearance, but many show variations in size and some are predominantly acidophilic. Among the nuclear irregularities, small pyknotic nuclei predominate, but there is also marked vacuolization of nuclei and cytoplasm. Abundant cytoplasmic granules are seen. When cervical hyperplasia is present, cervical cells appear singly or in sheets, with characteristics bordering

on those of malignant cells. When hyperkeratosis is present, the cells are fragmented; they stain a deep red-orange and may show no nuclei.

Alterations produced by malignant and premalignant conditions

Ayre[10] has placed in a precancerous category cervical cells which show double nuclei, nuclear irregularities, and vacuolization, especially if they are associated with low thiamine excretion and high endogenous estrogens in the patient.

Before attempting to identify cancerous cells in smears one must have a knowledge of the atypical cells and changes in normal cervical and vaginal epithelium which have been indicated thus far. Normal cells of the genital tract are exfoliated at regular intervals and are of several varieties. Cancer cells are exfoliated at a more rapid rate. The cells present in the smear can be correlated closely with the cells seen in a biopsy of tissue from the same patient. The exfoliated cells are dead, of course, and very rarely show mitoses, but they do present the typical changes of malignancy.

Diagnosis of a differentiated carcinoma may be made from a smear with a single cell or a few cells, but multiple groups of cells are necessary to complete a diagnosis of an undifferentiated or anaplastic neoplasm.

Squamous cell carcinoma of the cervix: In patients with cervical cancers the vaginal smears may be of several varieties, depending on the type of carcinoma and the degree of anaplasia. Generally speaking, the vaginal exudate associated with cancer, when smeared and stained, has a coloration which is peculiarly characteristic. There is a predominance of acidophilic vaginal cells, resulting presumably from estrogenic activity. Usually red blood cells are abundant. Polymorphonuclear leukocytes, phagocytes, and cocci also are prominent. In addition to these general characteristics, specific morphologic changes are seen in the squamous cells exfoliated by the neoplasm.

Individual cancer cells show marked irregularities in size, shape, and coloration both in the cytoplasm and in the nuclei. Nuclear-cytoplasm disproportion and abnormal staining qualities of the cytoplasm and its granules are characteristic. Pericellular and perinuclear membranes are very prominent. The nucleus is usually enlarged and irregular in contour. It may contain many chromatin granules and several nucleoli. The nucleus is usually hyperchromatic, and in some instances it may stain to the degree of complete opacity. Vacuolization of both nuclei and cytoplasm, with engulfed debris and blood cells, is common.

A prominent type of malignant cell is the tadpole-shaped cell with its irregular nucleus and deeply stained cytoplasm. Small cells with enlarged, abnormal nuclei predominate among the cell types seen in the undifferentiated squamous cell carcinoma.

The cellular characteristics which make possible a diagnosis of malignancy on the basis of the vaginal smear closely resemble the changes described by pathologists for the diagnosis of preinvasive cancer[11]. These changes have been found to be present from eight to ten years prior to invasion. Since these changes can be seen in vaginal smears long before the lesion is clinically apparent, we feel that this method has a definite place in our armamentarium against cancer.

Adenocarcinoma of the cervix and endometrium: Adenocarcinoma of the cervix presents a characteristic smear, containing groups of closely packed, small, hyperchromatic, irregular cells. These have a close similarity to the cells of the cervical anaplastic squamous cell carcinoma. Vacuolization is frequently present, and the vacuoles occasionally contain cells or cell fragments. The nuclear-cytoplasm ratio is reversed. Although it is difficult to diagnose this type of carcinoma accurately by smear, a correct diagnosis of malignancy is usually possible.

The ratio of endometrial cancer to cervical cancer is 1 to 8. Endometrial adenocarcinoma is the most difficult of all genital malignancies to diagnose on the basis of vaginal smears, since there are many benign conditions which also cause shedding of atypical endometrium and neoplastic cells. Adenocarcinoma produces as many characteristic cell changes as does the squamous-cell group, however. The small cells have little cytoplasm, and this stains deeply basophilic. Frequently, vacuolization causes ec-

10. Ayre, J. E.: Vaginal Cell Examination as a Routine in Diagnosis, South. M. J. 39:847-852 (Nov.) 1946.

11. (a) TeLinde, R. W. and Galvin, G.: Minimal Histological Changes in Biopsies to Justify Diagnosis of Cervical Cancer, Am. J. Obst. & Gynec. 48:774-797 (Dec.) 1944; (b) Pund, E. R. and Auerbach, S. H.: Preinvasive Carcinoma of the Cervix Uteri, J.A.M.A. 131:960-963 (July 20) 1946.

centric and folded nuclei. Many of the cells are closely clumped and show modified anisonucleosis. Single cells have deeply stained and very distinct nuclei and perinuclear membranes. The nuclei are large and hyperchromatic, frequently black. Groups of cells have engulfed debris, red blood cells, and polymorphonuclear leukocytes. Macrophages are abundant, as in menstrual smears.

In addition to the individual cell changes, the general changes associated with malignancy are present.

Squamous cell carcinoma of the vulva: In carcinoma of the vulva characteristic cells are found in the vaginal smears. These are large, with large oval or round spokewheel nuclei of the vesicular variety. The nuclei have prominent perinuclear membranes and nucleoli. The cytoplasm is abundant and usually stains a reddish-pink, although basophilic cells are not uncommon.

Sarcoma of the uterus may be diagnosed by vaginal smears. The general neoplastic picture is present, in addition to longer cells with neoplastic nuclei. These elongated cells may be quite irregular in outline and may take a deep basophilic or acidophilic stain. There are also irregular, large, deeply stained masses of chromatin material without cytoplasm. Large cells which stain a muddy lavender and which have very irregular nuclei are common. Sarcomatous cells found in vaginal smears may be confused by the inexperienced worker with cells exfoliated by either the squamous-cell carcinoma of the cervix or the adenocarcinoma of the endometrium.

Case Reports

Case 1

A colored, married woman, aged 61, was seen first in our clinic on May 26, 1947. Her chief complaint was "something protruding from my birth canal for seven years." She had had nineteen pregnancies, six of which terminated in abortions. Her menopause eleven years previously had been uneventful. Four episodes of vaginal spotting had occurred during the past eighteen months; the last was ten days prior to her first visit. There was no leukorrhea. The preliminary diagnoses were postmenopausal bleeding, chronic cervicitis, prolapsus uteri, cystocele, and rectocele. A biopsy made at the time of the first visit was reported as showing chronic cervicitis. A diagnosis of squamous cell carcinoma of the cervix, type V, was made from vaginal smears obtained at the first visit. A second biopsy, made on June 3, was again reported as indicating chronic cervicitis. On July 28, vaginal hysterectomy, bilateral salpingo-oophorectomy, anterior and posterior colporrhaphy, and perineorrhaphy were done. On this date, vaginal smears were diagnosed as type V. After numerous serial sections had been made, the pathologic examination revealed early squamous cell carcinoma of the cervix.

Case 2

A 55-year-old colored widow, who had had two pregnancies with one abortion, was seen first in the medical clinic on February 5, 1947, complaining of headaches and dizziness. She had had an uneventful menopause two years previously. On routine pelvic examination, erosion of the cervix was noted. The preliminary diagnosis was essential hypertension and chronic cervicitis. The report on a biopsy was chronic cervicitis. Papanicolaou smears were diagnosed as squamous cell carcinoma of the cervix, type IV, at this time. The patient was followed with monthly biopsies and vaginal smears until July 27, before the smear diagnosis made on February 5 was confirmed by pathologic examination.

Case 3

A white, married woman, aged 37, the mother of six children, was seen first in our clinic on April 1, 1947, with a referral diagnosis of squamous-cell carcinoma of the cervix. Her last pregnancy had terminated in the spontaneous delivery of a full-term infant three months previously. The last two months of gestation were complicated by preeclampsia and intermittent vaginal spotting. There was daily spotting after delivery. Ten days prior to her first visit here, a diagnostic curettage and cervical biopsy had been made. The pathologic report was squamous cell carcinoma of the cervix. A biopsy made on her first visit here was reported as showing chronic cervicitis without evidence of malignancy. Papanicolaou smears obtained on April 1 and April 7, however, were classified as squamous-cell carcinoma of the cervix, type V. A biopsy made on April 8, 1947, confirmed the original report on the biopsy made elsewhere. The final pathologic examination of the cervix and uterus, following radical hysterectomy and pelvic lymphadenectomy, showed cervical carcinoma **in situ.**

Case 4

A 55-year-old white woman who was separated from her husband was seen first in our clinic on September 15, 1947. She was referred by her local physician with a diagnosis of a questionable carcinoma of the cervix. She had six living children and had had one abortion. Her menopause eight years previously had been uneventful. For the past year there had been daily vaginal spotting associated with leukorrhea. The preliminary diagnosis was carcinoma of the cervix, stage I-II. The report on a biopsy made on September 15 was chronic cervicitis with atypical findings in the epithelium. Papanicolaou smears obtained at this time were classified as squamous-cell carcinoma of the cervix, type V. A second biopsy made on September 23 was reported as showing epidermoid carcinoma of the cervix, spinal-cell type.

Discussion

These 4 cases illustrate clearly the possibility of detecting early malignancy by the smear method. Preinvasive cervical carcinoma, although it sheds cells into the vagina, may present no visual evidence of a lesion. Thus it is easily possible for the operator to bite in the wrong place with the biopsy forceps.

Results Obtained at Duke

So far in this study, approximately 4750 smears from 1139 patients have been examined. Cancers were diagnosed by pathologic examination in 106 of these patients. Ninety-seven of these 106 malignancies were diagnosed by vaginal smears—an error of 9.1 per cent. Three of the nine failures to make the diagnosis were due to insufficient tissue or poor fixation, three to the fact that the smears were obtained after roentgen therapy, and three to failure to recognize cancer cells which were present in the smears.

False positive diagnoses were made in 28 of the remaining 1,033 patients—an error of 2.7 per cent.

Discussion

Relatively speaking, routine vaginal smears have been used by us for a comparatively short time. It must be realized that our technique and results are steadily improving in direct ratio to our experience. The vaginal-smear method has been proved to be an excellent procedure and one which should be added to our laboratory armamentarium. At the present time we feel that pathologic confirmation of smear diagnoses should be obtained in every case prior to institution of treatment.

The procedure is simple, though not inexpensive when one takes into account the necessary chemicals and the technical help needed. Only a short time is required to obtain and stain the smears, but careful and sometimes lengthy scrutiny is necessary for interpretation. The interpretation can be completed within thirty or forty minutes after the smears are taken, however—as compared to the one to four days required for biopsy.

The important feature of this procedure is its potentialities as a screening method for the detection of early cancer and of the precancerous but benign lesion. We believe that in the future this service will be available to every North Carolina doctor, as serology examinations are at the present time. The availability of such a service should encourage doctors to make frequent pelvic examinations, with the result that many more early lesions will be detected. Only then will we be able to decrease the death rate from genital cancer in women.

Summary

The technique introduced by Papanicolaou and Traut for obtaining, staining and interpreting vaginal smears in the diagnosis of cancer has been discussed.

Four cases have been cited which illustrate the fact that the diagnosis of preinvasive cervical carcinoma can be made much earlier by the vaginal smear method than by biopsy.

Approximately 4750 smears from 1139 patients have been studied at Duke. Ninety-seven cases of genital malignancy were diagnosed by smears out of a group of 106 diagnosed by pathologic examination of tissue—an error of 9.1 per cent. False-positive diagnoses were made in 28 of 1,033 patients—a percentage of 2.7.

Salient advantages of the vaginal-smear method in the diagnosis of genital cancer have been described. It is thought that this procedure will come to be a routine part of the complete physical examination of women.

The counterstains used in this study have been made available through the courtesy of Dr. C. E. Folsome of the Ortho Pharmaceutical Corporation, Linden, New Jersey.

We know the main facts about cancer. We know it is the chief cause of death in men and women in the years after 40—the time when they have established a place in life, a home, a reputation, when they are most useful to their profession and their country and most necessary to their families. We know that at first it is not a tumour but an insensible transformation of the cells in some part of the body to a structure that is a caricature of the normal rather than something new or different; that this new tissue has no nerve supply, and that it produces no inflammatory reaction in the normal parts surrounding it—in other words, that it is entirely painless, and in most cases entirely symptomless. We know that, for purposes of recording, cancers can be sorted into three stages, based on their gross naked-eye pathology: Stage I, in which there is a local growth only; Stage II, in which as well as the local growth there are early metastases in the nearest lymphatic glands or in tissues immediately adjacent; and Stage III, in which the primary growth or the metastases are fixed, or more distant organs are involved. We know also that in those parts of the body which can be effectively irradiated, or where a radical operation that satisfies pathological criteria can be performed—the breast, the colon, the rectum, and most parts of the skin—the five-year cures in Stage I are 80 to 90%, in Stage II about 50%, and in Stage III not more than 10%.—Ogilvie, H.: The Early Diagnosis of Cancer of the Oesophagus and Stomach, British M. J. 2:405 (Sept. 13) 1947.

THE CELLULAR CHANGES IN CARCINOMA OF THE PROSTATE FOLLOWING HORMONAL THERAPY

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ASHEVILLE

In 1893, White reported a series of 100 cases of prostatism treated by castration[1]. No differentiation between benign hyperplasia and carcinoma was made. The improvement in urinary obstruction was encouraging in some cases, but the procedure was discarded and nothing more was written about it for years.

One of the first steps toward the modern concept of prostatic carcinoma came in 1935: Kutscher and Wolbergs found that adult prostatic tissue and secretion are very rich in the enzyme, acid phosphatase[2], whereas the infantile gland contains only minimal amounts. The following year Gutman, Sproul, and Gutman confirmed this work and found that metastases from prostatic carcinoma are also rich in this enzyme[3]. It was thus logical to assume that the cell of prostatic carcinoma is, at least some of the time, well enough differentiated to retain its ability to elaborate acid phosphatase.

In 1941, Huggins and Hodges presented their thesis which has since revolutionized the treatment of prostatic cancer[4]. Because of its simplicity and brevity this thesis is quoted:

> "In many instances a malignant prostatic tumor is an overgrowth of adult epithelial cells. All known types of adult prostatic epithelium undergo atrophy when androgenic hormones are greatly reduced in amount or inactivated. In this paper evidence is presented that significant improvement often occurs in the clinical condition of patients with far advanced cancer of the prostate after they have been subjected to castration. Conversely the symptoms are aggravated when androgens are injected. We believe that this work provides a new concept of prostatic carcinoma."

In the six years since this paper appeared there have been many reports in the literature evaluating the *clinical* course of patients after the cell of prostatic cancer has been deprived of male sex hormone. In many cases castration or estrogen therapy has proven to be very beneficial. It results in prolongation of life and relief from pain. It is agreed, however, that this method of therapy is not curative. After a varying period of quiescence the cancer again asserts itself, causing, ultimately, a fatal outcome.

The histologic appearance of the cell of prostatic carcinoma after it has been deprived of male sex hormone has received very little attention, and few studies have been done on the acid phosphatase content of carcinomatous tissue following hormonal therapy. Although such studies involve only one phase of the disease, they may at least contribute to the ultimate realization of our fundamental objective—namely, to increase our knowledge of the metabolism and behavior of the cell of prostatic carcinoma, in order that further strides can be made in the treatment and control of this disease.

The Normal Prostate

The prostate, prior to puberty, is a small infantile gland at rest. The cells lining the acini are also small and inactive, producing no secretion. Chemical analysis of this prepubescent gland reveals only minimal amounts of acid phosphatase. The cells lining the adult prostatic acini, on the other hand, contain and secrete a solution rich in acid phosphatase. This solution serves as a liquid vehicle for the spermatozoa which are discharged from the ejaculatory ducts. The ability of the prostatic cells to elaborate this secretion is certainly due in large measure to the male sex hormone, since the eunuchoid prostate never achieves this ability.

Since he originally demonstrated the dependency of the adult prostatic epithelial cell on androgens, Huggins, with his coworkers, has continued to study the cell's metabolism. They have shown that, in addition to the large amount of acid phosphatase present in the normal adult prostate, it also has a high content of citric acid[5].

The Malignant Prostatic Cell

The malignant prostatic epithelial cell usually retains at least two characteristics

Read at the annual symposium of the Duke Medical Alumni Association, Durham, North Carolina, April 25, 1947.

1. White, J. W.: The Present Position of the Surgery of the Hypertrophied Prostate, Ann. Surg. 18:152-188, 1893.
2. Kutscher, W., and Wolbergs, H.: Prostatophosphatase, Ztschr. f. physiol. Chem. 236:237-240, 1935
3. Gutman, E. B., Sproul, E. E., and Gutman, A. B.: Significance of Increased Phosphatase Activity of Bone at the Site of Osteoplastic Metastases Secondary to Carcinoma of the Prostate Gland, Am. J. Cancer 28:485-495 (Nov.) 1936.
4. Huggins, C., and Hodges, C. V.: Studies on Prostatic Cancer; 1. The Effect of Castration, of Estrogen and of Androgen Injection on Serum Phosphatases in Metastatic Carcinoma of the Prostate, Cancer Research 1:293-297 (April) 1941.
5. Barron, E. S. G. and Huggins, C.: Metabolism of Prostate; Transamination and Citric Acid, J. Urol. 55:385-390 (April) 1946.

of its normal forebear: (1) the ability to elaborate acid phosphatase, as shown by chemical analysis; and (2) partial dependence on the male sex hormone for its metabolism. When deprived of male sex hormone, the malignant cell undergoes a temporary regression, evidenced by both clinical and histologic changes.

The study of the histologic and metabolic effects of hormonal therapy on the malignant prostatic cell may be divided into three phases: (1) before treatment, (2) after withdrawal or neutralization of the male sex hormone, and (3) after the reappearance of the cell's malignant qualities, when it has recovered from the temporary ill health occasioned by the withdrawal of the androgenic hormone. The line of demarcation between these phases is, of course, not clear cut.

Phase 1: Before treatment

The untreated prostatic carcinoma exhibits the same histologic appearance and behavior seen in other malignancies: the cells appear in all gradients between the well-differentiated acinus reproducing pattern and the undifferentiated amorphous mass of malignant cells. The tumor cells usually have large vesicular nuclei, prominent nucleoli, and granular, reticulated cytoplasms.

The classical modes of spread are by the perineural lymphatics and blood vessels. Metastases locate most regularly in the bones of the spine and pelvis.

Huggins and his coworkers have shown that the respiratory quotient of isolated human prostatic adenoma is relatively low, while both aerobic and anaerobic glycolysis is high[6]. They have also shown that when dogs are deprived of male sex hormone the oxidative phase of carbohydrate metabolism is diminished[6]. These observations are mentioned merely because they represent a step in the progress toward the fundamental objective stated above.

Phase 2: After withdrawal or neutralization of the male sex hormone

All the papers on the clinical aspects of this subject note that during this phase the prostate frequently diminishes in size and undergoes a decrease in induration, so that it feels practically normal. In many cases, however, the change in size and consistency of the prostate is negligible. Metastases in the bones and lungs have been seen to regress—in some instances, to a point where they are no longer detectable by x-ray. In metastatic bone lesions, x-ray changes which are interpreted as signifying healing are seen[7]. At the same time the serum acid phosphatase, when it has been elevated, is seen to drop significantly.

The first histologic study of prostatic tissue in this phase was mentioned by Huggins, who had biopsies made from a superficial lymph node metastasis before and after castration[8]. The original growth was a typical adenocarcinoma. The biopsy, one hundred and seven days after castration, showed diminution in the size of the acini, increase in connective tissue stroma, and areas of pyknotic and fused nuclei. No mention was made of cytoplasmic alterations.

The next such study appeared in 1942, and has remained as the only concentrated attempt to investigate the cellular pattern following hormonal therapy. It was carried out by Schenken, Burns, and Kahle, of New Orleans[9]. In 7 cases of carcinoma of the prostate they made one or more prostatic biopsies at varying intervals while the patients were receiving estrogens. After comparing these biopsies histologically with original biopsies, these workers described as follows what they conceived to be *the* series of changes resulting from diethylstilbestrol therapy: Vacuoles appear in the cytoplasm, and at the same time the nuclei tend to assume a basilar position. With the increase in the size of these vacuoles the cell membranes finally rupture, leaving the nuclei lying in clusters with no cell boundaries. While these cytoplasmic variations are taking place, the nuclei become progressively more pyknotic and smaller.

A critical perusal of the work of these authors gives rise to some skepticism regarding their conclusions—without, however, detracting from the definite value of their contribution. One reason for this skepticism is the small number of cases studied; another is the fact that the changes they describe are quite frequently seen in untreated prostatic

6. Barron, E. S. G. and Huggins, C.: The Metabolism of Isolated Prostatic Tissue, J. Urol. 51:630-634 (June) 1944.
7. Alvea, E. P., and Henderson, A. F.: Castration for Carcinoma of the Prostate, J. Urol. 48:673-681 (Dec.) 1942.
8. Huggins, C.: Effect of Orchiectomy and Irradiation on Cancer of the Prostate, Ann. Surg. 115:1192-1200 (June) 1942.
9. Schenken, J. R., Burns, E. L., and Kahle, P. J.: The Effect of Diethylstilbestrol and Diethylstilbestrol Dipropionate on Carcinoma of the Prostate Gland: II. Cytologic Changes Following Treatment, J. Urol. 48:99-112 (July) 1942.

carcinoma and, conversely, that many prostatic malignancies treated with stilbestrol fail to show these alterations.

Since the appearance of this work only six papers have been published dealing entirely or partially with the cellular changes of prostatic carcinoma following hormonal therapy[10]. One of these papers is by the same authors and is a follow-up of the same cases originally reported. Another describes changes similar to those reported by Schenken, Burns, and Kahle, but does not state how many cases were studied. There remain only four reports of cases studied in this fashion in the five-year period. The authors reporting these 4 cases agree, fundamentally, with Schenken, Burns, and Kahle. One point lacking unanimity, however, concerns changes in the cytoplasm. Some are indefinite in describing the cytoplasm; none state that vacuoles were seen. Two authors mention that the bulk of the growth has been apparently replaced by scar tissue, leaving only scattered pyknotic nuclei. All authors agree that there is diminution in the size and progressive pyknosis of the nuclei.

My interest in the histologic changes in the cell of prostatic carcinoma after hormonal therapy was aroused by a patient on the urologic service at Duke Hospital. This patient ultimately died and the autopsy findings were reported by Margolis and myself[10b]. In our discussion of the cellular changes, we mentioned 2 additional cases, one of which showed, in tissue containing obviously active growing tumor in spite of large doses of stilbestrol, the supposed regressive changes described by Schenken, Burns, and Kahle. The other showed these changes in tissue from an untreated prostatic carcinoma. In their original paper Schenken and his coworkers found the "regressive" changes in 25 of 44 untreated cases; and Ewing in his book on NEOPLASTIC DISEASES describes this cytoplasmic appearance in untreated prostatic carcinoma[11].

It is obvious that with the present information at hand it is injudicious to draw any specific conclusions regarding the cell changes in prostatic malignancy following inactivation or withdrawal of the male sex hormones. Changes obviously do take place, and there seems to be agreement as to the development of pyknotic nuclei. With a total of only 11 patients studied histologically in this phase, however—when thousands by now have been treated in like fashion—no generalizations are warranted.

Doubtless many clinicians are inclined to think that it makes little difference whether the cell of prostatic carcinoma, when deprived of the male sex hormone, has a vacuolated cytoplasm, a pyknotic nucleus, or a ruptured cell membrane. If we are ever going to attain control of prostatic carcinoma, however, everything that can be learned about this cell and its behavior in different situations should be studied.

Phase 3: After resumption of the cell's malignant qualities

The cell in this stage has the same appearance and morphology that it possessed in the original untreated state. This fact was very clearly and easily demonstrated in the case which we reported[10b]. Sections of actively growing tumor taken at autopsy were indistinguishable from the pre-treatment biopsy. It is true, however, that in such sections were found areas of fibrosis with embedded pyknotic nuclei, presumably representing tumor which had regressed when the male sex hormone was withdrawn. The significant point is that, even though the malignant cell in this stage is growing without male sex hormone, its appearance is unaltered.

As is so often the case, however, appearance alone does not necessarily give the key to behavior. For some unknown reason the cell now does not seem to like its original environment as well as its adopted homes—the metastatic areas. It has been observed many times clinically that the prostate maintains its decrease in size and induration, while metastases grow apace. This chain of events is not invariable, but it occurs frequently enough to form a pretty large group, if not a majority of the cases.

10. (a) Heckel, N. J., and Kretschmer, H. L.: Carcinoma of the Prostate Treated with Diethylstilbestrol: Histologic Alterations, J.A.M.A. 119:1087 (Aug. 1) 1942; (b) Gilbert, G. G., and Margolis, G.: Post-Mortem Findings in Carcinoma of the Prostate Following Castration and Diethylstilbestrol Therapy, J. Urol. 50:82-94 (July) 1943; (c) Kahle, P. J., Schenken, J. R., and Burns, E. L.: Clinical and Pathologic Effects of Diethylstilbestrol and Diethylstilbestrol Dipropionate on Carcinoma of the Prostate Gland; a Continuing Study, J. Urol. 50:711-732 (Dec.) 1943; (d) Graves, R. C., and Cross, J.: Regression of Lymph Node Metastases after Orchidectomy and Stilbestrol in Carcinoma of the Prostate; Report of a Case, J. Urol. 51:59-63 (Jan.) 1944; (e) Moore, G. F., Wattenberg, C. A., and Rose, D. K.: Breast Changes Due to Diethylstilbestrol during Treatment of Cancer of the Prostate Gland, J.A.M.A. 127:60-62 (Jan. 13) 1945; (f) Wattenberg, C. A.: Liver Changes and Other Effects of Diethylstilbestrol during Treatment of the Prostate Gland Cancer, J. Urol. 55: 631-40 (June) 1946.

11. Ewing, J.: Neoplastic Diseases, ed. 4, Philadelphia, W. B. Saunders Co., 1940, p. 851.

There is still another apparent difference in the revived cell's activity: it does not contain as much acid phosphatase as it did before treatment. In the case mentioned above[10b] we found at autopsy 8 K.A. (King and Armstrong[12]) units of acid phosphatase per gram of wet tissue, as compared to a normal of 500 to 1500. This finding of a low acid phosphatase value in the prostate deprived of male sex hormone has recently been confirmed in 4 cases by Woodard and Dean[13].

It may be concluded, therefore, that the cell of prostatic carcinoma, upon resuming its activity following regression caused by lack of androgens, assumes its original histologic appearance, but behaves differently by preferring metastatic areas for its growth, by growing with little or no male sex hormone, and by containing less acid phosphatase.

There is one related point of interest which applies in general to all three phases described: When Huggins first published his work he felt that tumors which were well differentiated histologically responded better to withdrawal of male sex hormone than did the anaplastic, undifferentiated growths[8]. This phase of the histology of prostatic carcinoma has been studied in detail. It has been shown that this conclusion is not warranted and that no correlation exists between cell type and prognosis[14]. This finding serves as another illustration that a tumor's appearance does not necessarily predict or reflect its behavior.

Summary and Conclusion

The background of the endocrine treatment for prostatic carcinoma has been reviewed. The life history of the malignant prostatic cell has been described—first in its unhampered state, then while it is temporarily incapacitated by being deprived of male sex hormone, and finally as it develops again into a killer in spite of its feminized environment. It is the purpose of this discussion to show that there are many avenues for further investigation of carcinoma of the prostate as a whole, and that much more study is needed on the cellular changes following hormonal therapy. Opportunities to increase our knowledge are many.

12. King, E. J. and Armstrong, A. R.: A Convenient Method for Determining Serum and Bile Phosphatase Activity, Canad. M. A. J. 31:376-381 (Oct.) 1934.
13. Woodard, H. Q., and Dean, A. L.: The Significance of Phosphatase Findings in Carcinoma of the Prostate, J. Urol. 57:158-171 (Jan.) 1947.
14. (a) Nesbit, R. M., and Cummings, R. H.: Prostatic Carcinoma Treated by Orchiectomy, J.A.M.A. 120:1109-1111 (Dec. 5) 1942; (b) Herger, C. C., and Sauer, H. R.: The Effect of Orchidectomy and Stilbestrol in Carcinoma of the Prostate, Am. J. Surg. 62:185-200 (Nov.) 1943.

GRANULOMA INGUINALE TREATED WITH STREPTOMYCIN

Report of a Case

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While the effectiveness of various antimony compounds in the therapy of granuloma inguinale has been established, adequate treatment with these drugs is difficult because of the long periods of time required and the toxic reactions which sometimes develop. The disease occurs most frequently in the type of individual who seldom follows a program of therapy regularly or for a sufficiently long period of time to effect a cure. There has been a continual search for a more rapid and adequate means of treatment for this disease analogous to the rapid treatment of syphilis. It is known that regular treatment with the arsenicals and bismuth will yield a large percentage of cures in syphilis, but only 15 to 20 per cent of the patients who begin this type of therapy ever complete the required course. Rapid treatment methods, especially those employing penicillin, have increased the percentage of patients who complete therapy to almost 100 per cent. Recently, Greenblatt with his coworkers[1] and Barton with his coworkers[2] have demonstrated that streptomycin is effective in the treatment of granuloma inguinale. Perhaps this is the "rapid treatment" which is needed so urgently in the therapy of this disease.

A case of extensive granuloma inguinale successfully treated with streptomycin is reported below.

From the Division of Dermatology and Syphilology, Department of Medicine, Duke University School of Medicine, Durham, North Carolina.

1. (a) Greenblatt, R. B., Kupperman, H. S., and Dienst, R. B.: Streptomycin in the Therapy of Granuloma Inguinale, Proc. Soc. Exper. Biol. & Med. 64:389 (April) 1947; (b) Greenblatt, R. B., Dienst, R. B., et al.: Granuloma Inguinale; Streptomycin Therapy and Research, J. Ven. Dis. Inform. 28:183-188 (Sept.) 1947.
2. Barton, R. L., Craig, R. M., Schwemlein, G. X., and Bauer, T. J.: Granuloma Inguinale Treated with Streptomycin, Arch. Dermat. & Syph. 56:1-6 (July) 1947.

Fig. 1. Photograph taken in 1945.

Case Report

A 38-year-old single colored man was first seen in the outpatient clinic of Duke Hospital on April 3, 1945. He stated that in May, 1942, when he reported for induction into the Army, he was found to have a positive serologic test for syphilis. At that time he received twenty-four weekly intravenous injections and was told that his serologic test for syphilis had become negative. Late in 1943 he developed a "sore" on the glans penis which was treated by circumcision. The operative wound healed incompletely. Exuberant red granulation tissue developed in the wound and spread peripherally. In June, 1944, the inguinal lymph nodes became enlarged bilaterally. These broke down in one month, and the velvety granulations typical of granuloma inguinale appeared. One x-ray treatment was given to the inguinal lesions. Some tablets (presumably sulfonamides) and three intravenous injections (presumably tartar emetic) were also given. This treatment did not produce improvement. The penis remained enlarged to about twice its normal size and was indurated and tender. The large areas of sharply demarcated, piled-up granulation tissue remained unchanged (fig. 1). The patient was, at that time, referred to the Duke Hospital outpatient clinic.

The serologic test for syphilis was negative. Frei and Ducrey tests were also negative, but scrapings from the inguinal lesions showed Donovan bodies. A diagnosis of granuloma inguinale was made, and he was referred to the Rapid Treatment Center in South Carolina, his home state, for treatment. He did not report there, however, but received an antimony preparation intravenously at irregular intervals from a private physician. He returned to Duke Hospital on June 16, 1947. At this time there was marked extension of the lesions (fig. 2), and he was completely incapacitated. He was, therefore, admitted to the hospital for streptomycin therapy.

Fig. 2. Photograph taken immediately before streptomycin therapy was begun.

Fig. 3. Photograph taken two months after completion of streptomycin therapy.

Physical examination showed the glans penis to be swollen many times its normal size, markedly tender, and indurated. Completely covering both inguinal regions and extending over the abdomen for about three inches was a large, red, weeping, tender, bleeding, butterfly-shaped granulomatous area. The remainder of the physical examination was essentially negative.

The hemoglobin was 30 per cent and there were 2,500,000 red blood cells. Scrapings from the lesions revealed numerous Donovan bodies. Serologic tests for syphilis were negative. The urinalysis was normal.

Streptomycin therapy in doses of 0.6 Gm. intramuscularly every four hours was started immediately upon admission. A total dosage of 32.4 Gm. was given. Continuous compresses of potassium permanganate in a dilution of 1:4000 were applied to the lesions. The patient received no other treatment.

On the third day of streptomycin therapy repeated smears for Donovan bodies showed a marked diminution in their number. After the fifth day, no Donovan bodies could be demonstrated in scrapings from the lesions. When he was discharged on July 3, 1947, the lesions were less tender and acute. Beginning epithelization was visible at the borders of the lesions.

On August 2, 1947, he returned to the outpatient clinic remarkably improved. There was 75 per cent epithelization of the lesions, and the patient was comfortable enough to resume work. On September 22 he returned for further observation. At this time the lesions were completely healed except for one small crusted patch on the pubis (fig. 3). On October 22 complete healing had taken place, leaving a large area of depigmented scar-tissue.

Summary and Conclusions

A case of granuloma inguinale of four years' duration treated with streptomycin is reported. The results achieved with this therapy are apparently excellent. It is hoped that the treatment of additional cases by this method, with adequate follow-up examinations, will prove that the initial good results are permanent.

At the present time streptomycin seems to be the best single drug available for the treatment of granuloma inguinale.

FLUORINE AND THE PREVENTION OF DENTAL CARIES

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Exceeding even the common cold in universality, dental caries is the most widespread affliction affecting mankind. With few exceptions, dental caries knows no age, sex, social or economic position, geographic location, or season; instead, it occurs constantly and continues the year around. When untreated, it results in the loss of large parts of the masticatory apparatus and may produce sequelae in many parts of the body. It is not surprising, then, that the experimental use of fluorides to prevent the occurrence of dental caries grips the eager interest of all who are concerned with this baffling public health problem.

The American Geographic Society has chosen fluorine as the first of its studies for the projected "Atlas of Diseases." Van Burkalow[1] reports that a study of fluorine in the water supply was chosen as the pilot project because of the direct relationship between dental health and an element of the physical environment. The primary purpose of the "Atlas of Diseases" is to show the correlation of disease with the natural and social environment.

The Relationship of Fluorine to Mottling of the Enamel

The discovery of the relationship between the fluoride content of the water supply and the incidence of dental caries stems from investigations which set forth to discover the cause of "mottling of the enamel."[2] These investigations, launched by the newly organized Dental Society of Colorado Springs in 1908, disclosed the fact that the disfigurement of the teeth was due to something in

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* Dental Health Officer, City Health Department, Charlotte, North Carolina.

1. Van Burkalow, A.: Fluorine in United States Water Supplies; Pilot Project for Atlas of Disease, Geo. Rev. 36:177-193 (April) 1946.

2. (a) Dean, H. T.: Endemic Fluorosis and Its Relation to Dental Caries, Pub. Health Rep. 53:1443-1452 (Aug. 19) 1938; (b) Dean, H. T., et al.: Domestic Water and Dental Caries, Including Certain Epidemiological Aspects of Oral L. Acidophilus, Pub. Health Rep. 54:862-888 (May 26) 1939; (c) Dean, H. T., Jay, P., Arnold, F. A., Jr., and Elvove, E.: Domestic Water and Dental Caries: II. A Study of 2,832 White Children, Aged 12-14 Years, of 8 Suburban Chicago Communities, Including Lactobacillus Acidophilus Studies of 1,761 Children, Pub. Health Rep. 56:761-792 (April 11) 1941.

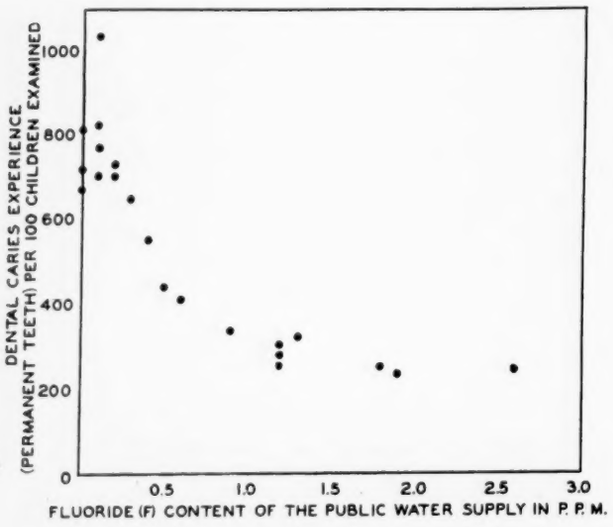

Fig. 1. Relation between the amount of dental caries (permanent teeth) observed in 7,257 selected 12- to 14-year-old white school children in twenty-one cities of four states, and the fluoride content of the public water supply. (Dean, Arnold, and Elvove[9d])

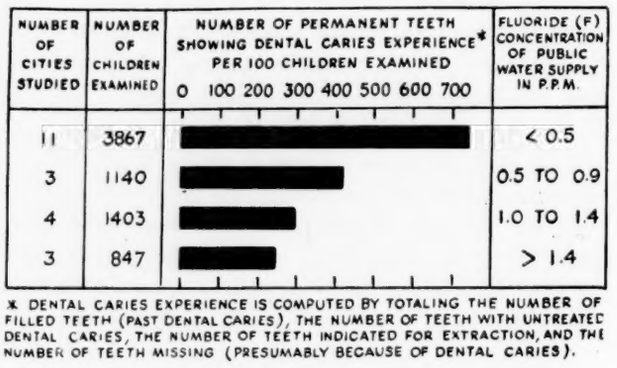
NUMBER OF CITIES STUDIED
NUMBER OF CHILDREN EXAMINED
NUMBER OF PERMANENT TEETH SHOWING DENTAL CARIES EXPERIENCE* PER 100 CHILDREN EXAMINED
0 100 200 300 400 500 600 700
FLUORIDE (F) CONCENTRATION OF PUBLIC WATER SUPPLY IN P.P.M.
11 3867 < 0.5
3 1140 0.5 TO 0.9
4 1403 1.0 TO 1.4
3 847 > 1.4
* DENTAL CARIES EXPERIENCE IS COMPUTED BY TOTALING THE NUMBER OF FILLED TEETH (PAST DENTAL CARIES), THE NUMBER OF TEETH WITH UNTREATED DENTAL CARIES, THE NUMBER OF TEETH INDICATED FOR EXTRACTION, AND THE NUMBER OF TEETH MISSING (PRESUMABLY BECAUSE OF DENTAL CARIES).

Fig. 2. Amount of dental caries (permanent teeth) observed in 7,257 selected 12- to 14-year-old white school children in twenty-one cities of four states, classified according to the fluoride concentration of the public water supply. (Dean, Arnold, and Elvove[9d])

the domestic water supply and that it occurred only in natives of the area or in people who had become residents during infancy or early childhood[3].

In 1931, after two communities—Oakley, Idaho[4] and Bauxite, Arkansas[5]—had changed their sources of water supply, Churchill[6] and others[7] simultaneously indicated that fluorine was the factor involved in mottling of the enamel. The water supply at Oakley was found to contain 8 parts of fluoride per million of water; that at Bauxite, 14 parts per million. Changing the water supply of these two towns prevented the occurrence of dental fluorosis (mottling of the enamel) in children born subsequent to the change[3,8].

The Effect of Fluorine on Dental Caries

After the relationship between excessive quantities of fluoride in the drinking water and mottling of the enamel had been established, Dean and his associates[2,9] showed that amounts of fluoride not exceeding 1 part per million did not produce dental fluorosis, and that an *inverse* relationship was present between the amount of fluoride in the domestic water supply and the occurrence of dental caries. They noted that "at concentrations of 0.9 to 0.5 part per million, the influence is less marked than at the higher concentrations; nevertheless, the dental caries experience rates are distinctly lower than those associated with the use of relatively fluoride-free waters."[9d] They concluded that: "Strikingly low dental caries prevalence was found associated with the continuous use of domestic waters whose fluoride (F) content was as low as about 1 part per million, a concentration which under the conditions prevailing in the localities studied produced only sporadic instances of the mildest forms of dental fluorosis of no practical esthetic significance."[9d]

Figures 1 and 2 show the relation between the fluoride content of the public water supply and the amount of dental caries of the permanent teeth observed in 7,257 12 to 14-year-old white school children of twenty-one

3. McKay, F. S.: Fluorine and Mottled Enamel: Historical Review, in Fluorine in Dental Public Health, published by the New York Institute of Clin. Oral Path. (Oct. 30) 1945, p. 10.
4. McKay, F. S.: Mottled Enamel: The Prevention of Its Further Production through a Change of the Water Supply at Oakley, Idaho, J. Am. Dent. A. 20:1137-1149 (July) 1933.
5. Kempf, G. A., and McKay, F. S.: Mottled Enamel in a Segregated Population, Pub. Health Rep. 45:2923-2940 (Nov. 28) 1930.
6. Churchill, H. V.: Discussion of Secretary's Report, Division of Water Sewage and Sanitation Chemistry, Indust. & Eng. Chem., News Ed., 9:105 (April 10) 1931.
7. (a) Smith, Margaret C., Lantz, E. M., and Smith, H. V.: Cause of Mottled Enamel, Defect of Human Teeth, University of Arizona College of Agric., Agric. Exper. Station Tech Bull., No. 32 (June 10) 1931; (b) Velu, H., and Balozet, L.: Darmous (Dystrophie dentaire) du Mouton et Solubilite du Principe actif des Phosphatees naturels qui le provoque, Bull Soc. path. exot. 24:848 (Nov. 12) 1931.
8. Dean, H. T., McKay, F. S., and Elvove, E.: Mottled Enamel Survey of Bauxite, Ark., Ten Years after a Change in the Common Water Supply, Pub. Health Rep. 53:1736-1748 (Sept. 30) 1938.
9. (a) Dean, H. T. and Elvove, E.: Studies on the Minimal Threshold of the Dental Sign of Chronic Endemic Fluorosis (Mottled Enamel), Pub. Health Rep. 50:1719-1729 (Dec. 6) 1935; (b) Dean, H. T., and Elvove, E.: Further Studies on the Minimal Threshold of Chronic Endemic Dental Fluorosis, Pub. Health Rep. 52:1249-1264 (Sept. 10) 1937; (c) Dean, H. T., Jay, P., Arnold, F. A., Jr., and Elvove, E.: Domestic Water and Dental Caries; I. A Dental Caries Study, Including L. Acidophilus Estimations, of a Population Severely Affected by Mottled Enamel and Which for the Past 12 Years has used a Fluoride-Free Water, Pub. Health Rep. 56:365-381 (Feb. 28) 1941; (d) Dean, H. T., Arnold, F. A., Jr., and Elvove, E.: Domestic Water and Dental Caries; V. Additional Studies of the Relation of Fluoride Domestic Waters to Dental Caries Experience in 4,425 White Children, Aged 12 to 14 Years, of 13 Cities in 4 States, Pub. Health Rep. 57:1155-1179 (Aug. 7) 1942.

cities in four states. As Dean and his co-authors pointed out[9d], "the relative homogeneity of these populations, the method of selecting the study groups, and the similarity of diagnostic standards used" make it unlikely that the differences in the incidence of dental caries in the different cities could be due to any factor "other than the mineral composition of the public water supply."

Table 1

Comparison of Fluoride Content of Water Supply and Dental Findings Among Selected 12- to 14-Year-Old White School Children in Illinois Cities (Arnold[10])

City	*Fluoride Content of Water Supply*	*Percent. Children Examined, Caries-Free*	*Caries Rate per 100 Children Examined*	*First-Molar Mortality per 100 Children Examined*
Maywood	1.2	29.8	258	11.7
Aurora	1.2	23.5	281	14.5
Evanston	0.0	3.9	673	42.6
Oak Park	0.0	4.3	722	31.0
Waukegan	0.0	3.1	810	79.9

Table 1[10] shows a comparison between the incidence of dental caries among children living in Aurora and Maywood, Illinois—communities with a water supply of relatively high fluoride content—and children living in three Illinois towns using the fluoride-free waters from Lake Michigan (Evanston, Oak Park, and Waukegan, Illinois). As this table shows, the percentage of caries-free children was about six times as great in the first two towns as in the last three. The contrast is even more striking when we realize that Maywood and Oak Park are only three miles apart.

This comparison gives an indication of the dental benefits to be expected from bringing the fluoride content of the water supply up to 1 part per million. Dean[2c] points out that in Aurora, with a fluoride content of 1.2 parts per million, mottled enamel, although it was encountered in 15 per cent of the children examined, was not an esthetic problem. The incidence of dental fluorosis at Maywood was 33.3 per cent. Dean explains this discrepancy on the basis of evidence indicating that, until a few years before the examinations, Maywood water probably contained 1.4 to 1.6 parts of fluoride per million.

Figure 3 indicates the relative location of eight Illinois communities studied, and gives the fluoride content of the water supply (F) and the caries-attack rate per hundred children examined.

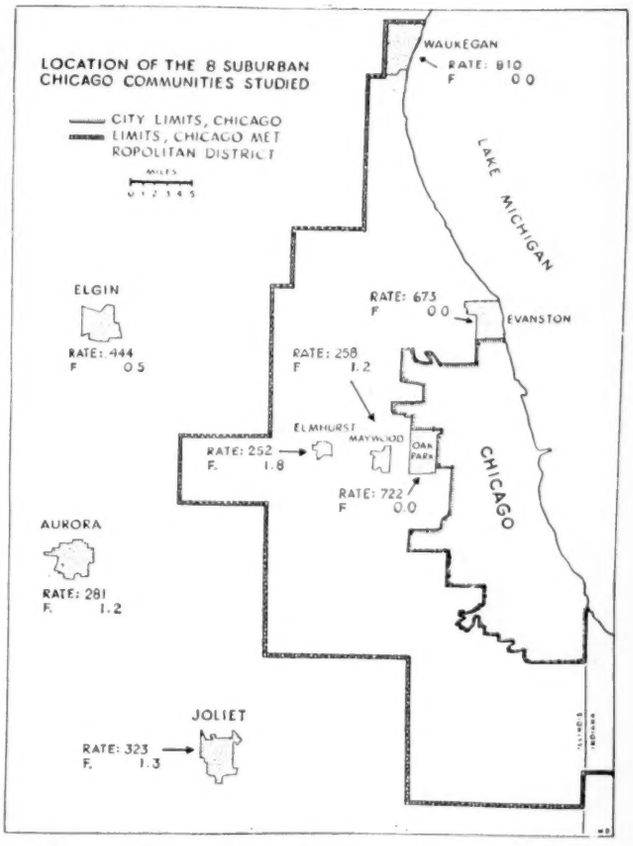

Fig. 3. (From Dean, H. T., in J. Am. Water Works Assoc. 38:1161-1186 (Sept.) 1943.)

The Artificial Addition of Fluorine to Water Supplies

In light of the above findings, it was only natural to conjecture on the possible results of adding fluorides to fluoride-deficient or fluoride-free water in sufficient amounts to bring the fluoride content up to 1 part per million. The United States Public Health Service[11] allows a maximum fluoride content of 1.5 parts per million in drinking water.

Possible harmful effects

Several million people in many different parts of the country have been using, for many years, water containing much higher amounts of fluoride than one part per million, without any apparent ill effects other than fluorosis of the teeth. The water supply of Colorado Springs contains approximately 2.5 parts of fluoride per million of water; that of Amarillo, Texas, 3.8 parts per million; and that of Lubbock, Texas, 5.1 parts per million. The question arises, however, as to whether there are any dangers involved in the *artificial* addition of fluorides to the

10. Arnold, F. A., Jr.: Role of Fluorides in Preventive Dentistry, J. Am. Dent. A. 30:499-508 (April) 1943.

11. Public Health Service Drinking Water Standards, Pub. Health Rep. 61:371-384 (March 15) 1946.

water supply.

Roholm[12] has determined that the lethal dose of sodium fluoride is 4 Gm., the sublethal dose 230 mg. What would this mean in terms of the Charlotte water supply? At the present rate of consumption (about fifteen million gallons a day), around 308 pounds of 90 per cent pure sodium fluoride would be required daily to bring the fluorine content up to 1 part per million. By comparison, a lethal dose would require more than a quarter of a million pounds, while a sublethal dose would require more than 14,476 pounds, or 7 tons of sodium fluoride.

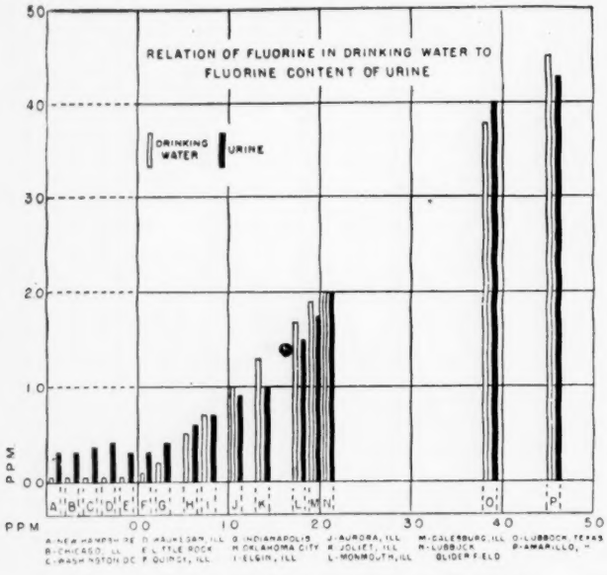

Fig. 4. (From McClure and Kinser[14])

Machle[13] determined that the normal urinary excretion of fluoride is approximately 1 mg. per liter, and that there is a correlation between the amount ingested and the amount excreted. McClure[14], from his study of the amounts of fluorine present in the urine of inductees from many areas (fig. 4), concluded that urinary excretion of fluorine is proportional to the amount of fluorine in the water supply, up to 5 parts per million. He states further that "the uniformity in the urinary-fluorine figures for areas as widely separated as New Hampshire, Washington, D. C., Waukegan and Chicago and Quincy, Ill., Indianapolis, Ind. and Little Rock, Arkansas suggests that the content of fluorine in the average human diet, exclusive of drinking water is remarkably uniform regardless of locality. It may be suggested that this is indicative also that fluorine in food produce is quite uniform, regardless of the conditions under which the food is produced."

Following the ingestion of food estimated to contain 0.3 to 0.6 mg. of fluorine, about 88 per cent of this amount appears in the urine and about 8 per cent in the feces[15].

McClure[14] points out that the close correlation between the fluoride content of drinking water and the urinary excretion of fluorine reduces the hazard of cumulative toxic bone fluorosis. In view of the low concentrations of fluorine in domestic waters, he states that "this form of fluorine toxicosis seems unlikely to become an endemic health problem." Evidence of fluorine toxicosis related to skeletal storage of fluorine has not been reported in association with the domestic use of fluoride-containing waters in the United States, even though, up to 1928, the water in Bauxite, Arkansas, contained 14 parts of fluoride per million of water.

In order to obtain information regarding possible skeletal effects of dietary fluorine, McClure[16] investigated the relation between fluorine ingested in domestic drinking waters and the height, weight, and bone-fracture experience of selected groups of high school boys and inductees. The data obtained, while not permitting final conclusions, suggested that there was no relation between the ingestion of fluoride in drinking water and fracture experience (fig. 5) or growth.

McClendon and Foster[17] swallowed 1 Gm. of a fluorapatite toothpowder, containing nearly 4 per cent fluorine, daily for three years (in the case of Foster). At the end of this time no osseous change could be demonstrated roentgenographically. Each excreted 10 mg. of fluorine per day during this period.

While there is overpowering evidence that the addition of one part of fluoride per million in the domestic water supply can have no toxic effect, there is still the possibility that an unusual amount of sodium fluoride

12. Roholm, Kaj: Fluorine Intoxication: A Clinical-Hygienic Study, London, H. K. Lewis, 1937.
13. Machle, W.: Normal Urinary Fluorine Excretion and the Problem of Mottled Enamel, Dent. Cos. 77:612-615 (June) 1936.
14. McClure, F. J., and Kinser, C. A.: Fluoride Domestic Waters and Systemic Effects; II. Fluorine Content of Urine in Relation to Fluorine in Drinking Water, Pub. Health Rep. 59:1575-1591 (Dec. 8) 1944.
15. Machle, W., Scott, E. W., and Largent, E. J.: The Absorption and Excretion of Fluorides; I. The Normal Fluoride Balance, J. Indust. Hyg. & Toxicol. 24:199-204 (Sept.) 1942.
16. McClure, F. J.: Fluoride Domestic Waters and Systemic Effects; I. Relation to Bone-Fracture Experience, Height, and Weight of High School Boys and Young Selectees of the Armed Forces of the United States, Pub. Health Rep. 59:1543-1558 (Dec. 1) 1944.
17. McClendon, J. F., and Foster, W. C.: The Non-Toxicity for Adults of Fluorine in Tooth Powder, J. Dent. Research 25:183 (June) 1946.

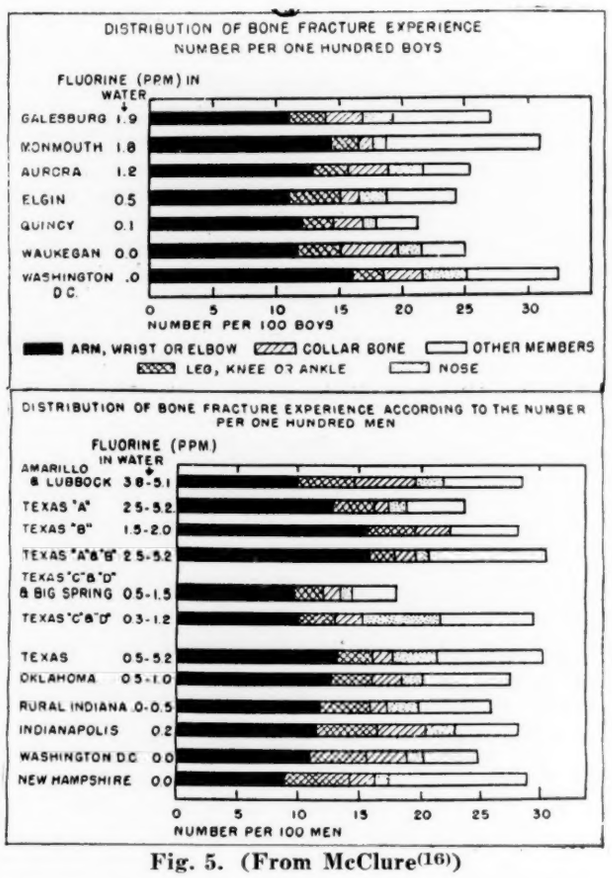

Fig. 5. (From McClure[16])

powder might accidentally be dumped into the water supply. The likelihood of such an occurrence is remote, especially when we consider the efficiency of personnel and equipment, and the requirements for meticulous care in our modern metropolitan water plants. Water-works personnel are well experienced in the careful management of a variety of chemicals, including chlorine. Harris, chief chemist of the Water Department at Grand Rapids, Michigan (where the first and largest study on the addition of fluoride to a water supply is under way), stated that in the event of an accident involving around 500 pounds of sodium fluoride, the ultimate concentration of fluoride in the drinking water would probably not be more than 10 parts per million[18].

Harris[18] also stated that the addition of fluoride to water, even in amounts as great as 500 parts per million, gives no taste.

Possible beneficial effects

Studies all over the world[9d,19] make it evident that the greatest degree of protection against caries is conferred on those who, from birth through the eighth year of life, have been continuously exposed to domestic water supplies containing around 1 part of fluoride per million. This is the age-span during which the crowns of all the permanent teeth, with the exception of the third molar, are completely developed. Wisan[20], however, has shown that children moving into a community with a fluoride-containing water supply after their fourth birthday will benefit significantly by their subsequent exposure to the water (fig. 6).

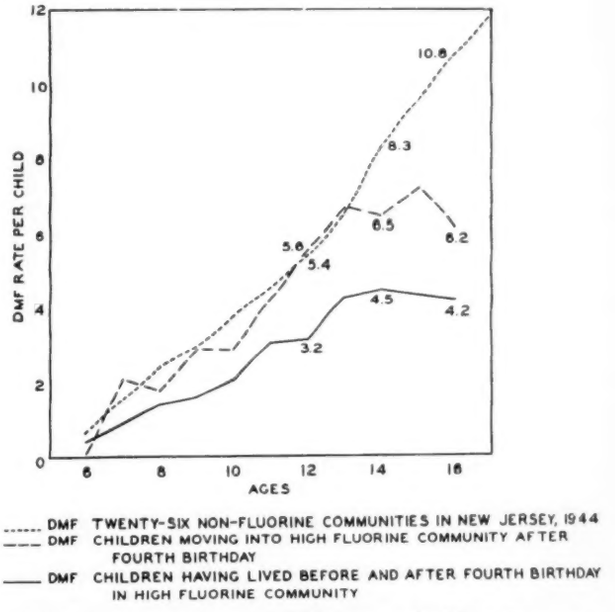

Fig. 6. Comparison of DMF rates in New Jersey communities (Wisan[20]). The DMF rate is the total number of teeth decayed, missing (or indicated for extraction), or filled.

Children of older years (8-10) may also benefit by moving into such a community. Klein[21] concluded from his observations on two groups of relocated Japanese children that "among young children (ages 8 to 10 years) transferred to an area where the drinking water contained 3 ppm of fluoride the incidence of new caries experience in previously non-carious erupted teeth was reduced approximately 60 per cent below that which would be expected on the basis of the incidence observed in the control group . . . that among teeth present in the mouth at

18. Harris, W. L.: Experience in the Application of Fluoride to a Public Water Supply, Lectures, Univ. of Mich. School of Pub. Health, May 22-24, 1945.
19. (a) Lukomski, I.: Fluorine in Medicine (1940); abstrated by J. F. Volker in Am. Rev. Soviet Med. 2:543-546 (Aug.) 1945; (b) Ockerse, T.: Endemic Fluorosis in Pretoria District, South African M. J. 15:261-266 (July 26) 1941; (c) Weaver, R.: Fluorosis and Dental Caries on Tyneside, Brit. Dent. J. 76:29-40 (Jan. 21) 1944.
20. Wisan, J. M.: Dental Caries and Fluorine-Water, Pub. Health News, State Department of Health, Trenton, N. J. 27:139 (Oct.) 1944.
21. Klein, H.: Dental Caries Experience in Relocated Children Exposed to Water Containing Fluorine: I. Incidence of New Caries after 2 Years of Exposure among Previously Caries-Free Permanent Teeth, Pub. Health Rep. 60:1462-1467 (Dec. 7) 1945.

the beginning of exposure to fluorine, those most recently erupted were those most protected against caries attack." Weaver[22] arrived at similar conclusions from observations on 800 English children who had immigrated into an area where the drinking water contained 1.4 parts of fluoride per million of water. It remains to be seen whether a similar beneficial effect will be conferred on newly-erupted teeth by the artificial addition of sodium fluoride to the community water supplies.

Topical Application of Fluorine to the Teeth

It has been further demonstrated that fluorides topically applied to the teeth, particularly those that are newly erupted, result in a 21 to 50 per cent inhibition of new dental caries. Knutson[23], Dwyer[24], and Jordan[25] indicate that four to seven applications of 1 or 2 per cent solutions of sodium fluoride, preceded by dental prophylaxis, are likely to give the maximum reduction in new dental caries. Armstrong[26] determined that the mean fluorine content of the enamel of sound teeth is about 0.0111 per cent, while that of carious enamel is 0.0069—62 per cent less. He stated that fluorine, once it is deposited in the enamel, "does not quickly leave this structure, and it is doubtful if its amount is ever decreased."

Studying the effects of different kinds of fluorides on pure dried enamel and dentin, Bibby[27] found that acidulated lead fluoride reduced enamel solubility by 85 per cent, while acidulated sodium fluoride reduced enamel solubility by 55 per cent. Sodium acetate-acetic acid was used as a buffer. A mixture of sodium fluoride and hydrogen peroxide reduced enamel solubility by approximately 60 per cent. Clinically, Dwyer[24] has demonstrated a 50 per cent reduction in new decay on teeth treated with a 1 per cent solution of sodium fluoride. Bibby's own clinical investigation[28] showed that the topical application of a 1:1000 solution of sodium fluoride resulted in a 46 per cent reduction in new caries. He postulates that "the freshly-erupted tooth surface (and, to a large degree, freshly-powdered tooth substance) offers an immature or chemically unreacted surface which under ordinary circumstances is a relatively soluble hydroxyl apatite and anything which reacts with it to form a less soluble apatite or phosphate complex will increase the resistance to dental caries."

Other studies on the prophylactic effect of fluorine in dental caries involve dentifrices, mouth washes, and tablets, all containing fluorides.

The Effects of Fluorine on Medical Conditions

Lukomski[19a] has reported that the oral administration of five drops of a 1 per cent solution of sodium fluoride, three times daily for three to four weeks, gives satisfactory results in osteomyelitis.

Lewy[29], an otolaryngologist, was interested in the influence of fluorine on the prevention of some forms of deafness. He found that the incidence of hearing defects among 109,869 children in fluoride-free areas was 4.9 per cent, as compared with 2.8 per cent among 20,488 children in areas with a water supply containing more than 1.4 parts of fluoride per million. Some of the cities which are adding fluoride to their water supplies are including periodic physical examinations of the children in the community. It will be interesting to see if their findings confirm Lewy's observations.

Aisenberg[30] made a study of ten-year records for poliomyelitis and suggested that communities with water supplies containing 1 part or more of fluoride per million had 45 per cent less polio than fluoride-free communities. He states: "It will be interesting to observe if fewer cases of polio will appear in those communities that are now adding 1 ppm or less of fluoride to the water supply for the inhibition of dental caries."

22. Weaver, R.: Fluoride and Dental Caries: Further Investigations on Tyneside and in Sunderland, Brit. Dent. J. 77:185-193 (Oct. 6) 1944.
23. Knutson, J. W., Armstrong, W. D., and Feldman, F. M.: The Effect of Topically Applied Sodium Fluoride on Dental Caries Experience; IV. Report of Findings with Two, Four and Six Applications, Pub. Health Rep. 62:425-430 (Mar. 21) 1947.
24. Dwyer, H. Shirley, Dental Director, State Board of Health, New Hampshire: Personal communication, Nov. 16, 1946.
25. Jordan, W. A., Wood, O. B., Alliston, J. A., and Irwin, V. D.: The Effects of Various Numbers of Topical Applications of Sodium Fluoride, J. Am. Dent. A. 33:1385-91 (Nov. 1) 1946.
26. Armstrong, W. D.: Fluorine as It Relates to Caries, Northwest Dent. 21 (July) 1942.
27. Bibby, B. G.: Use of Fluorine in Prevention of Dental Caries, III. A Consideration of the Effectiveness of Various Fluoride Mixtures, J. Am. Dent. A. 34:26-32 (Jan. 1) 1947.
28. Bibby, B. G.: The Use of Fluorine in the Prevention of Dental Caries; II. Effect of Sodium Fluoride Application, J. Am. Dent. A. 31:317-321 (Mar. 1) 1944.
29. Lewy, A.: The Possible Value of Nontoxic Concentrations of Fluorine in the Prevention of Deafness from Otosclerosis and Fibrosis, Arch. Otolaryng. 39:152-154 (Feb.) 1944.
30. Aisenberg, M. S.: Further Studies of Exposed Pulps as Portal of Entry for Poliomyelitis Virus, J. Am. Dent. A. 33:1109-12 (Sept. 1) 1946.

Mechanism of Action of Fluorine on Tooth Structure

The means by which trace amounts of fluorine confer such protection to the tooth structure continue to provide an area of considerable study. Gottlieb[31] states that "Sodium fluoride attracts calcium with a power twice the attraction of oxygen for iron, but does not coagulate protein. When the organic matter in the enamel is fluorinized it attracts calcium from its surroundings and from the saliva. The attracted calcium combines with the fluorine to form insoluble calcium fluoride, thereby obstructing the invasion roads." The "invasion roads" are the organic channels of the enamel, considered until recently as completely inorganic.

Gerould[32], using the electron microscope and the polystyrene silica-surface replica technique, showed that fluorine ingested during tooth development combines with tooth structure in a different way from topically applied fluorine. Fluorine ingested during the years of tooth development is presumed to become caries-resistant calcium fluorapatite, while fluorine absorbed directly into the erupted teeth becomes calcium fluoride, also caries-resistant. Gerould explains the caries-resisting action of fluorine as follows: When oral Lactobacillus acidophilus or other acidogens form acid which attacks the enamel, the soluble hydroxyl apatites are dissolved first, leaving a concentration of calcium fluoride or fluorapatite on the surface. The more intense the dissolution by the acid-forming bacteria, the greater the concentration of the fluoride ions, until the concentration is so high that bacterial growth and acid formation are inhibited.

The Prevention of Dental Caries as a Public Health Problem

Dean and his associates[2b,c,9c] observed that differences in the counts of Lactobacillus acidophilus in the saliva corresponded to the differences in the dental caries experience in the groups studied. From the nutritional point of view, the extensive work of Boyd and Drain[33], Bunting[34], and Jay[35] would indicate that L. acidophilus counts can be reduced by the restriction of carbohydrate in the diet. Thus it would appear that the incidence of dental caries could be reduced if the public could be taught to consume less carbohydrate food—especially refined sugar, the greatest single source of carbohydrate. Since public education along this line would be a slow and difficult process, it appars that the addition of fluorides to the water supply, to bring the fluoride content of drinking water up to 1 part per million, provides the best method of mass partial control of dental caries available at present.

As Dean stated in 1944[36], "the possibility of partially controlling what is frequently termed the most prevalent disease of civilized man, dental caries—at a cost of a few cents per person per year—constitutes a pressing challenge" to all concerned with the health of the public. This challenge was not without response. Today a growing list of communities are adding fluorides to their water supplies, under very carefully controlled conditions, to bring the fluoride content up to 1 part per million. Among these communities are Grand Rapids and Midland, Michigan; Evanston, Illinois; Sheboygan, Wisconsin; Newburgh, New York; Marshall, Texas; Ottawa, Kansas; Southbury, Connecticut; and Brantford, Ontario (Canada). Cities which have the plan under consideration include Rochester, Minnesota; Summit, New Jersey; and Charlotte, North Carolina.

The effectiveness of the addition of fluorides to the water supply may be tentatively indicated within a few years in Grand Rapids, Brantford, and Newburgh — communities which started their studies during 1945. The more definitive results, however, will not be evident until one generation has been continuously exposed to fluoride-containing water through the first eight years

31. Gottlieb, B.: Caries Prophylaxis, Texas Dent. J. (Jan.) 1947.

32. Gerould, C. H.: Electron Microscope Study of the Mechanism of Fluorine Deposition in Teeth, J. Dent. Research 24:223-233 (Oct.) 1945.

33. (a) Boyd, J. D., Drain, C. L., and Nelson, M. V.: Dietary Control of Dental Caries, Am. J. Dis. Child. 38:721-725 (Oct.) 1929; (b) Boyd, J. D., Drain, C. L., and Stearns, G.: Nature of Diet in Its Relationship to Control of Dental Caries, Proc. Soc. Exper. Biol. & Med. 36:645-646 (June) 1937; (c) Boyd, J. D. and Drain, C. L.: Arrest of Dental Caries in Childhood, J.A.M.A. 90:1867-1869 (June 9) 1928.

34. Bunting, R. W., Jay, P., and Hard, D. G.: Report of Successful Control of Dental Caries in Three Public Institutions, J. Am. Dent. A. 18:672-678, 1931.

35. Jay, P., Hadley, F. P., and Bunting, R. W.: Observations on Relationship of Lactobacillus Acidophilus to Dental Caries in Children during Experimental Feeding of Candy, J. Am. Dent. A. 23:846-851 (May) 1936.

36. Dean, H. T.: On the Epidemiology of Fluorine and Dental Caries, in Fluorine in Dental Public Health, published by the N. Y. Institute of Clin. Oral Path. (Oct. 30) 1945, p. 19.

of life and has been compared with a control group at two-year intervals up to the age of 14 years. Therefore, not until 1960 may the anticipated proof of Dean's hypothesis be available.

It seems reasonable to expect that the hypothesis will be confirmed. Hence, fluorination projects, established with proper controls before the final results of the initial investigations are available, will likely have gained years of protection against dental caries for the coming generations.

Discussion

Member: You talk about the dangers of accidentally dropping an entire day's supply of fluoride into the water supply. What are the chances of this accident's occurring?

Dr. Stadt: My reference to the accidental addition of the entire contents of a hopper of sodium fluoride was intended only to exaggerate the situation. As I pointed out, a little more than 300 pounds of 90 per cent pure sodium fluoride would be required daily for the city of Charlotte. If the total contents of the fluoride hopper, about 500 pounds, were for some extraordinary reason dumped into the water supply at one time, the concentration of the fluoride in the water storage would still be well within safe limits.

The machinery employed for the addition of sodium fluoride would be equipped with an alarm (both red light and ringing bell) to indicate any appreciable under- or over-feed, a totalizer to indicate the total pounds of the chemical fed, and a recorder to indicate on a 24-hour chart when the feeder was started and stopped, the weight fed over any period, the weight of chemical in the hopper at any time, and the time at which the hopper was refilled. Thus the possibility of such an accident would be exceedingly remote.

Member: Would it be possible to add sodium fluoride to the private water supply in the home?

Dr. Stadt: It is possible, but the cost for an individual family at the present time (in the case of a private well) would be exorbitant.

Dr. Robert F. Young (Halifax): Has any investigation been done on placing fluorides in tablets?

Dr. Stadt: Yes, but there is no adequate evidence available to indicate that this use of fluoride will be of any benefit. In addition, there is the danger of overdosage, which would cause mottling of the enamel.

Two thirds of our population are supplied by communal water supplies. If the addition of fluorides to communal water supplies becomes standard procedure throughout the country, how will we best provide caries control for the children of the other third of our population? Continuing studies on the use of fluorides or other chemicals in mouth washes, in dentifrices, and in solutions and cleaning pastes applied directly to the teeth by the dentist, may provide us with the answer to this problem.

Dr. John W. Williams (Williamston): Does fluorine account for the fact that better teeth are found in the population west of the Mississippi?

Dr. Stadt: There's no question about it. Dr. Dean and his associates of the U. S. Public Health Service have pointed out this relationship, stating that 79 per cent of the areas of endemic dental fluorosis—that is, mottled enamel—are located west of the Mississippi.

I might add, in conclusion, that the American Dental Association has now gone on record as favoring the use of topical applications of 1 and 2 per cent solutions of sodium fluoride to the teeth of children—especially to newly erupted permanent teeth—for the prevention of significant amounts of dental caries.

ROUTINE BLOOD CULTURES IN PEDIATRICS

E. S. KING, M.D.

WINSTON-SALEM

Bacteriologic culture of the blood employing appropriate culture media can be an extremely important diagnostic tool in pediatric practice. The usefulness of the procedure, however, is dependent upon the care with which it is done and upon a knowledge of the indications for its use. Full value cannot be obtained except from a laboratory prepared not only to make the initial culture and interpret the result, but also to continue any further differential studies required for the final identification of the organism or organisms. Unless blood cultures are carefully done and carefully interpreted by trained personnel, they may serve no useful purpose.

Possible Sources of Confusion

At times the results obtained from a blood culture are more confusing than enlightening. The explanation for such a situation can frequently be found in one of the following possibilities:

1. Contamination of the cultures through faulty technique.
2. The appearance of a totally unsuspected organism, either as a pure culture or as a member of a mixed infection.
3. The presence of a so-called nonpathogenic organism.

The first of these possibilities is avoided by strict aseptic technique; the occurrence of the second may be confirmed by repeated cultures; and confusion resulting from the last may be cleared up by changing our understanding of the term "nonpathogenic organism." Strict adherence to the definition of the word is dangerous practice, because we occasionally see cases of bacteremia or

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septicemia due to so-called nonpathogenic bacteria. In one patient seen in our hospital recently the only organism cultured on numerous attempts was Bacillus subtilis. It is necessary to consider these organisms as potentially pathogenic, and to remember that they can acquire pathogenicity, especially in patients with lowered immunity. In this connection, one must recall that immunity in young infants is only of a passive nature, and that until the baby reaches the antibody-producing age, organisms not frequently seen in infections of older children or adults may invade the blood stream. Since age *per se* does not ensure full and complete "antibody maturity," older children may also lack the necessary weapons to fight these unsuspected invading organisms.

Number of and Indications for Blood Cultures

The number of cultures required to establish the presence of bacteremia varies widely, but is usually between one and nine. We find that the best plan is to make two or three cultures a day for two or three days. This method favors quick diagnosis and the early institution of specific treatment. A greater number may be required to establish the diagnosis, and a much greater number is needed in following the course of the disease.

It would not be wise to attempt to enum erate the many clinical conditions in which blood cultures may be an aid in diagnosis. Suffice it to say that they are indicated in every case of obscure illness accompanied by fever and signs of infection. Culture of the blood should be routine in such cases. Dunham[1] states that "many cases of septicemia are overlooked or are diagnosed only when localized lesions appear unless blood cultures are made in all cases of obscure illness in the neonatal period."

Types of Septicemia

On the basis of clinical manifestations, septicemias may be divided into three broad groups:

1. Those occurring in the newborn.
2. Those occurring as part of a bacterial disease.
3. Those occurring without an explanation as to the point of entry of the organism.

Septicemia may exist in the newborn without fever or leukopenia. Jaundice is frequently observed in newborn babies with blood-stream infections due to Escherichia coli, staphylococci, or Pseudomonas aeruginosa. The streptococcus is, however, the most frequent blood-stream invader in the newborn.

Typhoid bacteremia, pneumococcic bacteremia as a part of pneumococcic pneumonia, and the bacteremic phase of meningococcic meningitis are well-known examples of bacteremia occurring as part of a bacterial disease.

Perhaps the most baffling of the three categories is the last, in which the source of the organism is unknown and the probability and site of localization are equally uncertain.

Incidence of Septicemia

A question that we have been interested in for some time is this: How frequently is the blood stream invaded by the "opportunist" organism in the apparently healthy person? Some investigators have reported this occurrence in a very large percentage of individuals examined. Okell and Elliott[2] stated that 10 per cent of 110 patients with poor oral hygiene showed cocci in their blood cultures. Murray and Moosnick[3] reported that 55 per cent of 336 patients with dental disease had positive blood cultures an hour after they were allowed to chew paraffin. These observations were made in adults, but one might expect comparable results in younger patients with corresponding mouth lesions.

Following surgical procedures

Fischer and Gottdenker[4] made blood cultures on 50 patients two hours after tonsillectomy and found that 16, or 32 per cent, had either staphylococci, pneumococci, or streptococci in their blood streams. Southworth and Flake[5] reported a study of 22 tonsillectomy cases in which blood was taken for culture immediately after the patient

1. Dunham, E. C.: Septicemia in the New-Born, Am. J. Dis. Child. 45:229-253 (Feb.) 1933.
2. Okell, C. C., and Elliott, S. D.: Bacteriaemia and Oral Sepsis with Special Reference to Aetiology of Subacute Endocarditis, Lancet 2:869-872 (Oct. 19) 1935.
3. Murray, M., and Moosnick, F.: Incidence of Bacteriemia in Patients with Dental Disease, J. Lab. & Clin. Med. 26: 801-802 (Feb.) 1941.
4. Fischer, J., and Gottdenker, F.: Uber transitorische Bakterieneinschwemmung in die Blutbahn nach Tonsillektomie, Wein. klin. Wchnschr. 49:177 (Feb. 7) 1936.
5. Southworth, H. and Flake, C. G.: Blood Cultures after Tonsillectomy, Am. J. M. Sc. 195:667-672 (May) 1938.

was anesthetized and again five minutes postoperatively. Three, or 13.6 per cent, of the preoperative blood cultures, and four, or 18.2 per cent, of the postoperative cultures were positive. In no case was there growth in both the preoperative and postoperative cultures.

Seifert[6] found positive blood cultures in 22 per cent of a group of patients who had just had appendectomies. This same author reported a study of single blood cultures taken ten minutes after surgical incision of abscesses. He found that 45 per cent of them were positive, and further, that the same organism was identified in the blood as in the pus.

Such findings require that we give some thought to the bacteremic state induced by surgical procedures, and, if practical, employ chemotherapy at the appropriate time in order to avoid possible serious complications. This consideration becomes more important when the patient is below par physically or has cardiac damage from rheumatic fever or other diseases, including congenital abnormalities.

In hospital patients

Between 1942 and 1946, blood cultures were made from 1929 patients on various services in the North Carolina Baptist Hospital. The results are shown in table 1. The incidence of bacteremias is not exceedingly high, but is great enough to be significant. Since some of the patients were getting antibacterial therapy at the time the blood was taken for culture, PABA was added to all culture media to act as an antagonist to sulfonamides, so that the organisms present in the blood sample would have a fair chance to grow. Apparently it is not necessary to include a penicillin antagonist in the culture medium. The higher incidence of positive cultures on the urologic, obstetric, and orthopedic services seems to confirm the belief that surgical procedures serve as channels through which resident bacteria find an entrance into the circulation.

Organisms Isolated by Blood Culture

In the pediatric cases[7] the staphylococcus was found more frequently than any other single organism, appearing in 55.9 per cent

6. Seifert, E.: Uber Bakterienbefunde im Blut nach Operationen, Arch. f. klin Chir. 138:565-586, 1925.
7. King, E. S.: Observations on 2233 Blood Cultures and Their Interpretation, to be published.

Table 1

The Incidence of Positive Blood Cultures in Patients on Various Services in the North Carolina Baptist Hospital, 1942-1945

Number of Admissions	*Cases in Which Blood Cultures Were Made*		*Cases in Which Cultures Were Positive*	
	No.	*Percent. (Of admissions)*	*No.*	*Percent. (Of cases in which cultures were made)*
Pediatrics				
2176	370	17.46	23	6.21
Medicine				
5703	1104	19.3	41	3.7
Surgery				
5316	189	3.5	10	5.3
Urology				
2262	119	5.2	11	9.2
Obstetrics and Gynecology*				
3427	190	5.5	16	8.4
Orthopedics				
1388	52	3.7	5	9.6

*Two years only, 1942-1943

of the positive blood cultures. In the 23 cases in which positive cultures were obtained, staphylococci appeared thirteen times, alpha streptococci five times, pneumococci twice, and beta hemolytic streptococci, meningococci and Bacillus subtilis once each. In adults, on the other hand, the staphylococcus is much less common than the streptococcus. Among the patients on the adult medical service[7], 55.2 per cent of the total of 41 positive cultures were alpha streptococci. The explanation for the more frequent occurrence of streptococci in the blood stream of adults probably lies chiefly in the fact that chronic foci of infection are much more common in adults.

Streptococcus sanquis

A new organism was encountered in 2 patients from the pediatric group. The occurrence of this organism in subacute bacterial endocarditis was first noted by Loewe and his coworkers[8] in 1946, and later by White and Niven[9]. The name given it originally was Streptococcus s.b.e., but it has since been named Streptococcus sanguis. It has not been found to cause any disease process except subacute bacterial endocarditis. The first group of authors discovered the organism by detailed blood culture studies in a group of patients who failed to respond to the usual

8. Loewe, L., Plummer, N., Niven, C. F., Jr., and Sherman, J. M.: Streptococcus S.B.E. in Subacute Bacterial Endocarditis, J.A.M.A. 130:257 (Feb. 2) 1946.
9. White, J. C. and Niven, C. F., Jr.: Streptococcus S.B.E.; Streptococcus Associated with Subacute Endocarditis, J. Bact. 51:717-722 (June) 1946.

treatment with penicillin and heparin. They have now identified the organism in nearly 200 cases; in each case the organism possessed certain physiologic and serologic characteristics which distinguished it from any other previously known green streptococcus. The organism has been found to constitute about one third of all types identified from a large group of alpha streptococci. One of its most important properties therapeutically is its greater resistance to penicillin. Standard sensitivity tests show it to be resistant to concentrations as high as 5 units per cubic centimeter, whereas many other species of alpha streptococci yield to penicillin in concentrations of 0.5 unit or less per cubic centimeter. This finding evidently explains why some cases of subacute bacterial endocarditis fail to respond to treatment, or continue to have recurrences.

Ordinary culture methods reveal nothing to make one suspect the presence of a new, different, and resistant organism. It grows in small colonies, is green in color, and arranges itself in chains, as do all other alpha streptococci. It possesses certain physiologic properties, however, which serve to distinguish it from the more common alpha streptococci found in subacute bacterial endocarditis, such as Streptococcus salivarius, Streptococcus mitis, Streptococcus bovis, Streptococcus agalactiae, and Streptococcus faecalis. In addition, Streptococcus sanguis is serologically distinct from other types of alpha streptococci, so that it seems to comprise a relatively homogenous group. Washburn, White and Niven[10] have subjected all the isolated strains to agglutination and precipitation studies, and have shown that they fall into two distinct serologic groups, which are called types I and II. About 95 per cent fall into the first group and about 5 per cent into the second. The precipitation test has been found to be more satisfactory than the agglutination test in the serologic differentiation.

Attempts to discover the habitat of this organism in the human body have been unsuccessful. The gums, teeth, pharynx, and nasopharynx have all been carefully investigated, with entirely negative results. It has been recovered once in a cultural study of an extracted tooth, and once from the washings of a chronically infected maxillary sinus. All other efforts to find it in various sites in the body have ended in failure. Since Streptococcus sanguis has a high tolerance for bile, investigators have investigated the intestinal tract as a possible source of the organism. So far these investigations have been fruitless.

Sensitivity Determinations as a Guide to Treatment

Sensitivity tests are simple to do and interpret, and require little in the way of equipment. Anyone with reasonable technical training can satisfactorily perform them. They should be a routine part of blood culture studies, because of the marked variation in the susceptibility of organisms to the various chemotherapeutic agents. The purpose of the laboratory is to aid the clinician, but here it may be said to do more than aid: it actually directs the choice of the drug or drugs and the dosage employed. Thus it frequently determines the outcome of the case.

The desirable procedure in the management of bacteremia is to isolate the organism, determine its comparative susceptibility to the accepted group of drugs, and then employ the most effective drug in the dosage indicated by the test. Subsequent cultures should be obtained after treatment has been started, to show when the organism disappears from the blood, and also to reveal any change in susceptibility to the drug. It is a well known fact that an organism can acquire drug-fastness when the dose of the drug has been too small. Organisms develop drug-fastness to sulfonamides more frequently than to penicillin. Harrell and his coworkers[11] have recently shown that some bacteria may become resistant to streptomycin in as short a time as eight hours. Once resistance is acquired, it increases until the drug used becomes completely ineffective in any dosage. This fact emphasizes the importance of sensitivity tests to determine the proper dosage before administration of the drug is begun.

In situations were laboratory facilities are not available, or where the patient's condition is too critical to allow time for the desired studies, chemotherapy should be begun

10. Washburn, M. R., White, J. C., and Niven, C. F., Jr.: Streptococcus S.B.E.; Immunological Characteristics, J. Bact. 51:723-729 (June) 1946.

11. Aikawa, J. K., Gillikin, C. M., Herndon, E. G., Jr., and Harrell, G. T.: Simple Laboratory Aids for the Control of Streptomycin Therapy in General Practice, South. M. J. 40:141-153 (Feb.) 1947.

immediately after blood is taken for culture. As to dosage under these conditions, it is probably better to give too much than too little. Future changes in therapy can be dictated by the results of the blood culture and sensitivity tests. The blood stream is sterilized by penicillin within twelve to twenty-four hours when a susceptible organism is present; therefore, blood must be taken for culture before or soon after penicillin therapy is begun.

Of the different species of gram-positive cocci usually encountered in subacute bacterial endocarditis, the two most resistant and difficult to treat successfully are Streptococcus faecalis and Streptococcus sanguis. MacNeal and Blevins[12] reported the isolation of a strain of the former organism which resisted *in vitro* destruction by 500 units of penicillin per cubic centimeter, but yielded easily to enterococcus bacteriophage.

In our group of 23 pediatric cases with positive blood cultures, we did not encounter a single case of bacteremia from a gram-negative bacillus. This type of infection may occur, of course, and when it does, streptomycin would probably be the drug of choice. Sulfonamides might also prove to be highly valuable, however.

The Prevention of Septicemias

The treatment of infections of the circulatory system has been completely revolutionized in the past decade. Scientists are constantly searching for new and more powerful antibacterial agents, both chemotherapeutic and antibiotic. We now talk freely about "cure" of septicemia—an accomplishment seldom possible until very recently. Equally important is the prevention of bloodstream infections. Damage to the lining of the circulatory system, especially the heart, and to various other organs, can in many cases be prevented by the prophylactic use of sulfonamides or penicillin before and after the performance of surgical procedures such as the removal of tonsils, the extraction of diseased teeth, and the incision of abscesses. This prophylaxis is particularly indicated in patients who are run down or below par, and even more important in patients with congenital or rheumatic heart disease.

12. MacNeal, W. J., and Blevins, A.: Bacteriological Studies in Endocarditis, J. Bact. 49:603-610 (June) 1945.

Summary

1. In the performance of blood cultures careful technique and the choice of appropriate media are essential.

2. A blood culture study is indicated in every obscure illness with fever and signs of infection, and in occasional cases without these signs, especially in the neonatal period.

3. Therapy should be guided by sensitivity tests made with the drug or drugs under consideration.

4. In children who are below par physically and in whom surgery is necessary, sulfonamides or penicillin should be employed before and after operation as a prophylaxis against bacteremia. Children with rheumatic or congenital heart disease particularly need prophylactic therapy during bacterial infections and before and after surgical procedures.

ATLANTOCRANIAL DISLOCATION WITH SURVIVAL

A Case Report

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WILMINGTON

The rising volume and speed of travel on our highways has resulted in an increase in both the incidence and the complexity and unusual nature of bodily injuries encountered. Patients injured by automobiles are usually orthopedic problems, but most often are treated by the general surgeon or general practitioner, at least in the early stages of their illness. The purpose of this paper is to report an unusual injury—namely, posterior dislocation of the skull on the first cervical vertebra—treated on a general surgical service. An exhaustive search of the literature failed to unearth any reference to a similar injury. More than two hundred original articles were read, and the Research Department of the American College of Surgeons reviewed all the literature available to them. A few cases of fracture of the atlas have been reported, and about 200 cases of dislocation of the atlas on the axis; none of these cases have involved the atlantocranial

From the Department of Surgery, James Walker Memorial Hospital, Wilmington, North Carolina.

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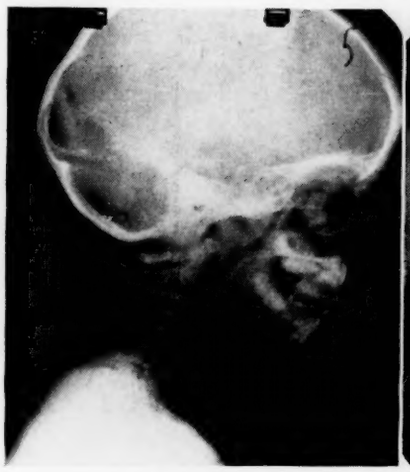

Fig. 1

Fig. 2

Fig. 3

joint, however.

Report of Case

The patient, a 6-year-old white boy, was struck by an automobile on March 5, 1945. Apparently the bumper and left front fender struck his body, giving the characteristic "whip-lash" effect to the head and neck as he slid back over the fender. The trunk and extremities suffered only minor contusions. He was brought into the emergency room, jack-knifed in his father's arms, his chin resting on the sternum. When he was placed on the examining table it was obvious that the alignment of the neck was incorrect, and I extended the head into the accepted position for neck injuries. Respirations and heart action ceased immediately, but resumed when the head was returned to its former position of flexion. Gentle manual traction was applied, and an x-ray made (fig. 1). The report was: "There is anterior dislocation of the first cervical vertebra on the skull."

Manual reduction was considered, but this idea was abandoned, since the slightest motion of the head caused marked irregularity of the pulse and respirations. General neurologic examination was entirely normal, and remained so throughout.

A halter was fashioned to supply traction with the neck flexed, and fifteen pounds' pull was instituted with the child supine in an inclined bed. An x-ray made two days later

Fig. 4

Fig. 5

(fig. 2) showed only slight improvement, and the pulse and respirations continued quite erratic. By the third day the patient had become so active that it was impossible to keep him in any position more than a few minutes at a time; the pulse and respirations were regular. The halter was adjusted to a more comfortable position midway between flexion and extension, the same traction being maintained. At the end of two weeks no further improvement in the position could be detected by the x-ray. Manual traction was carefully exerted and the patient was taken to the cast room and seated on a stool. By means of pulleys, traction was applied vertically with the head erect. About 20 pounds of weight was added, so that he was almost lifted off the stool, and a plaster cuirass was applied to the trunk, neck, and head. An x-ray made through the cast (fig. 3) showed no change in the dislocation.

A few days later the patient was discharged in excellent condition. During the next four months he wore the cast with little, if any, inconvenience. He rode his bicycle, played ball, and did all the things a boy of his age would do. At the end of four months the cast was outgrown and completely worn out. It was replaced by a neck brace. An x-ray was made (fig. 4) and showed that "The dislocation previously demonstrated has been completely reduced." The brace was kept tight enough to prevent motion of the head for four months, and then gradually lowered. Twelve months after the injury full range of motion was permitted, and the brace was discarded. X-rays made in flexion (fig. 5), extension, and mid-position showed that the reduction was maintained.

It has now been two years since the original injury, and the child is normal in every respect. He has full range of motion.

Discussion

The joint between the skull and the atlas is mechanically unstable. The articular surfaces are flat, almost horizontal, planes allowing a wide range of motion, but the ligamentous and muscular attachments are strong. This joint probably owes its immunity to injury more to weakness of the joints below than to inherent strength. Brookes[1] reported that half the injuries to the cervical spine occurred at the atlanto-axial joint. Wolff[2], in reviewing autopsy records on criminals who died by hanging, found many types of injuries, all located at or below the atlanto-axial joint.

Summary

A case of posterior dislocation of the skull on the atlas has been presented. The patient survived with no residual disability. No similar case could be found in medical literature.

1. Brookes, T. P.: Dislocations of the Cervical Spine, Surg., Gynec. & Obst. 57:772-782 (Dec.) 1933.

2. Wolff, R.: Injury to Cervical Vertebrae as Result of Judicial Hanging, J.M.A. South Africa 2:460-462 (Sept. 8) 1928.

Maternal Welfare Section*

CASE REPORTS FROM THE MATERNAL WELFARE RECORDS

Anesthetic Accidents

Obstetric anesthesia has been of interest from earliest times. The literature upon the subject is constantly increasing as the search for an ideal obstetric anesthetic continues. Articles describing new methods or modifications of the older ones often make far-reaching claims which seldom meet the test of time.

The ideal obstetric anesthetic would be one which affords complete relief of pain, with absolute safety for the mother and no adverse effects upon the child. It is unfortunate that no such method is available; although all of the standard anesthetic agents are relatively safe, they must be administered by trained personnel employing special techniques if good results are to be obtained.

Twelve of the first 175 consecutive maternal deaths analyzed by the Maternal Welfare Committee were the result of anesthetic accidents. The two case reports which follow illustrate common anesthetic problems.

Case 1—N. C. M. W. C. 42

A married white woman, 34 years of age, consulted her physician in the third month of pregnancy. She had no complaints and her past history revealed no significant illnesses or operations. Two previous pregnancies had been uncomplicated and had resulted in the delivery of living children.

*Prepared for the Maternal Welfare Committee of the Medical Society of the State of North Carolina.

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Physical examination did not reveal any abnormalities. The pelvic measurements, both internal and external, were within normal limits. The urinalysis and blood count were normal, and the Wassermann test was negative.

The patient's prenatal course was uneventful. She visited her doctor twelve times during the prenatal period; on each occasion the blood pressure, urine, and fetal development were considered to be normal.

On September 1, 1946, labor began spontaneously. One hundred milligrams of demerol and 0.4 mg. of scopolamine were used for analgesia during the six-hour labor. The presentation was vertex with the occiput in the left anterior position, and the head appeared at the introitus.

A hospital nurse administered ether by the open-drop method for the obstetric anesthetic. As anesthesia was being induced, the patient vomited and aspirated a large amount of semi-solid and liquid vomitus into the trachea and bronchi. She became cyanotic; her pulse rate rose to 160 per minute, and her blood pressure fell to 80 systolic, 20 diastolic. As much material as possible was removed from the pharynx and trachea by suction. The patient was delivered with outlet forceps, and a small episiotomy was repaired quickly. The baby was normal, and weighed 7 pounds, 12 ounces.

Examination of the chest following delivery revealed numerous moist and bubbling rales throughout both lungs. During the puerperium, the patient continued to be mildly cyanotic, and the pulse rate remained at 120 or above in spite of continuous oxygen therapy. The temperature increased progressively, and became septic in type, rising to levels of 104 F. and above during the last forty-eight hours of her life. The patient died on September 3 of a rapidly progressive bronchopneumonia, in spite of heroic therapy with penicillin and sulfadiazine which was begun immediately following delivery. A competent medical consultant assisted in the postpartum care of the patient. Permission for an autopsy could not be obtained.

Discussion

Three deaths due to aspiration of stomach contents during ether anesthesia have been reported to the Maternal Welfare Committee. Many additional non-fatal cases have come to our attention; in each instance, the patient very nearly lost her life. The gastric emptying time is often prolonged during labor, and this statement applies to liquid as well as solid food. It is not unusual for a patient to vomit food ingested twenty-four hours or more prior to the induction of anesthesia. Aspiration of the vomitus occurs while the laryngeal reflexes are abolished during general anesthesia.

Mendelson[1] studied 66 such cases which occurred in the New York Lying-In Hospital from 1932 to 1945. He stated that "two entirely different syndromes may follow aspiration. Aspiration of solid food usually produces the well-known picture of laryngeal or bronchial obstruction. Complete obstruction produces suffocation. Incomplete obstruction produces massive atelectasis with the classical picture of cyanosis, tachycardia, dyspnea, mediastinal shift, and signs of consolidation over the collapsed area . .. Aspiration of liquid material produces an asthmatic-like syndrome with distinct clinical, roentgenologic and pathologic features . . . There is cyanosis, tachycardia, and dyspnea, but no mediastinal shift or massive atelectasis. Wheezes, rales, and rhonchi are heard over the affected portions of the lungs."

Aspiration of stomach contents into the lungs is preventable. Mendelson's recommendations to avoid this complication included: (1) withholding of oral feedings during labor, (2) wider use of local anesthesia where indicated and feasible, (3) emptying of the stomach prior to administration of the general anesthetic, (4) adequate delivery room equipment, including transparent anesthetic mask, tilting delivery table, suction apparatus, laryngoscope, and bronchoscope.

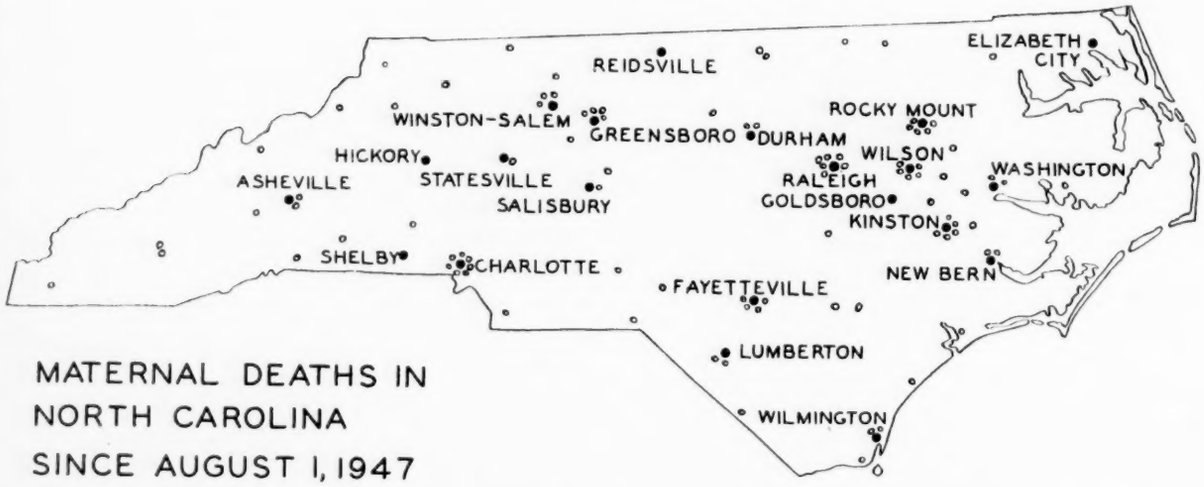
A competent anesthetist should be employed in all obstetric cases. If gagging or retching occurs during the induction of anesthesia, the patient should be encouraged to vomit, and under no circumstances should an attempt be made to force the anesthesia if the stomach has not been emptied.

If aspiration occurs, as much solid and liquid material as possible should be removed from the trachea and pharynx by suction. Bronchoscopy may be necessary for the removal of pieces of solid food. The patient should be put in the head-down position for drainage of the bronchial tree, and coughing should be encouraged to eliminate as much foreign material as possible. Large amounts of oxygen are often necessary to combat the associated asphyxia.

Case 2—N. C. M. W. C. 37

A married colored woman, 21 years of age, consulted a physician in the fifth month of her first pregnancy. A complete history and physical examination revealed no abnormalities. External and internal pelvic measurements were within normal limits. The urinalysis and blood count were normal, and the Wassermann test was negative. The patient's prenatal course was uncomplicated; and the blood pressure, urine, and fetal development were found to be normal at each of eight prenatal examinations. No evidence of toxemia of pregnancy occurred, and her condition was excellent when labor began spontaneously on November 27, 1946.

1. Mendelson, C. L.: Aspiration of Stomach Contents into the Lungs during Obstetric Anesthesia, Am. J. Obst. & Gynec. 52:191-205 (Aug.) 1946.



The presentation was vertex, and although the progress of labor was quite slow, it was considered satisfactory. Complete dilatation of the cervix was noted after approximately twenty hours of labor. At 5 p.m. on November 28, after twenty-five and a half hours of labor, the presenting part was in the mid-pelvis in the right occiput transverse position. The attendant decided that a forceps delivery was indicated, and preparation was made for this obstetric operation.

Spinal anesthesia was selected, and a spinal puncture was made between the third and fourth lumbar vertebrae without difficulty. Twenty milligrams of pontocaine was used as the anesthetic agent. It was administered slowly, the patient was scrubbed and draped, and all preparations were made for delivery. As the patient was being examined prior to the application of forceps, she gasped and died suddenly.

A stillborn child weighing 8 pounds, 3 ounces, was delivered without difficulty after the mother's sudden death. Permission for an autopsy could not be obtained.

Discussion

A strong trend to the use of regional anesthesia in obstetrics has developed since the original publications on caudal anesthesia appeared. DeLee has long advocated the use of local infiltration for obstetric anesthesia, and has cautioned against the danger of profound anesthetic reactions when spinal anesthesia is used in obstetrics. Cosgrove, Hall, and Gleeson[2], as well as Parmley and Adriani[3] have clearly shown that spinal anesthesia is a safe obstetric method if special techniques are used and if the dosage of the anesthetic is approximately half that ordinarily used for surgical procedures. Cosgrove recommends 50 to 75 mg. of novocain as the spinal anesthetic agent. Adriani uses 3 mg. of nupercaine in combination with dextrose to produce a hyperbaric solution which will gravitate to the lower part of the spinal canal, producing a saddle-block type of anesthesia.

In the experience of the Maternal Welfare Committee, any elevation in blood pressure or evidence of toxemia of pregnancy is a contraindication to the use of spinal anesthesia. In view of the limited use of this anesthetic method in North Carolina, it represents a particular hazard to the patient unless special techniques are used. Six of our first 175 deaths occurred as the result of a spinal anesthetic. In 5 of the cases, sudden death followed shortly after the administration of the anesthetic agent. In the sixth, an infection occurred, resulting in meningitis and death nineteen days after delivery.

Spinal anesthesia should be administered by a trained anesthetist. A small oral dose of a barbiturate before administration of the anesthetic offers some protection against a reaction to the drug. Ephedrine and the elevation of the patient's legs will assist in combatting a fall in the patient's blood pressure if this occurs. Continuous oxygen is of value in combatting hypotension and nausea and vomiting. The patient's pulse and blood pressure should be checked at intervals of five minutes or less until they are well stabilized. Spinal anesthesia should not be used unless an attendant is present to check the patient's pulse, blood pressure, and respiration. Then an emergency may be handled satisfactorily in most instances.

2. Cosgrove, S. A., Hall, P. O., and Gleeson, W. J.: Spinal Anesthesia with Particular Reference to Its Use in Obstetrics, Anesth. & Analg. 16:234-237 (July-Aug.) 1937.
3. Parmley, R. T. and Adriani, J.: Saddle Block Anesthesia with "Nupercaine" for Obstetrics, South. M. J. 39:191-195 (March) 1946.

CHAPTERS IN THE HISTORY OF THORACIC SURGERY

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I

THE BEGINNINGS

In 1896, in the preface to his book, *The Surgery of the Chest*, Stephen Paget wrote: "there are signs that we have reached a stage, in this portion of our art, beyond which, on our present lines, we cannot advance much further." This pronouncement, introducing a work authoritative in its time, rings strangely in modern ears; for it was not until thirteen years after the publication of Paget's work that endotracheal anesthesia was evolved and the true advance of thoracic surgery began. Through all the preceding centuries surgeons had fumbled, at first reluctantly, then more daringly, with thoracic problems: the sum of their accomplishments may be reduced to a few sentences. Of the twelve articles in this series, this first will deal with the progress of thoracic surgery from earliest times to the close of the nineteenth century; the remaining eleven will, for the most part, have to do with the tremendous accomplishments in the various branches of thoracic surgery which have taken place in the twentieth century.

Primitive man, observing that the beating of the heart and the expansion and contraction of the chest in breathing are the accompaniments of life and cease with death, came to think of the thorax as the seat not only of life but of the soul and the emotions as well. Thence derived a natural reluctance to interfere with so sacred a repository. This reluctance, together with fear aroused by the observation that penetrating open chest wounds were invariably fatal, stayed the hand of the surgeon for centuries. Except in attempts to repair wounds of the chest and in empyema drainage, surgeons seldom or never invaded the chest cavity.

The earliest surgical records which have been preserved, the Egyptian, show a considerable knowledge of the anatomic structure of the thorax and its organs. Egyptian surgeons, as far as we have evidence, apparently made little use of this knowledge, probably confining themselves to treatment of fractured and dislocated clavicles, fractured ribs, and minor chest wounds.

The Egyptian knowledge and practices were passed on to the Greeks, who made notable advances. The chief of these was the operation for empyema, *paracentesis pulmonis*. How this procedure originated is not definitely known; it was an established technique in the time of Hippocrates and his school. Physicians were skilled in determining the presence and exact location of fluid in the chest and in selecting the appropriate place and size for the incision, which was made with scalpel or cautery. The drainage was carried on over a period of two days, the wound being stopped with a tent of raw flax. When the drainage was complete, the cavity was partly filled with a mixture of wine and oil, and the wound plugged with a linen cloth. Various complications were provided for as nearly as possible. It was recognized that if the drainage fluid was thin and watery and flowed all at once, or if the fluid was fetid and mixed with blood, the patient died. Hippocrates and his disciples also recognized the symptoms of pleurisy and advocated pneumothorax when the disease came as the sequel of a chest wound or of empyema drainage.

For about eighteen hundred years thoracic surgery made no appreciable progress beyond the teachings of Hippocrates and his school. Celsus and Galen in Roman times followed the dicta of Hippocrates with but slight variations, and relayed them to their successors. The Arabian physicians of the Dark Ages and the European surgeons of the early Renaissance, with but few and inconsiderable exceptions, accepted the authority of the ancients in this as in other fields of surgery. Empyema drainage was widely practised, but there existed otherwise a stern taboo against the invasion of the thoracic cavity.

The sixteenth century saw the authority of Galen assailed by Paracelsus, Vesalius, and Paré. Freed of this dominance, surgeons came to use their own clinical experience as the basis of new techniques and treatments. New and accurate anatomic knowledge became available. This general advance did not notably affect the progress of thoracic surgery. Paré himself gained an extensive knowledge of thoracic injuries during his

career as a military surgeon, and his surgical opus contains numerous comments on wounds of the chest and their treatment—comments clearly the result of long and careful observation. He was the earliest surgical writer to present a good description of cutaneous emphysema. Nevertheless Pare' confined himself to wound repair, empyema drainage and the other established procedures, and made no new departures. In like manner the great surgeons who came after him—Fabricius, Willis, Solingen, Wiseman, Baglivi and Belloste of the seventeenth century, and Heister, Me'ry, Hewson, and Richter of the eighteenth century—, while revising conventional techniques and occasionally suggesting new procedures, made few real advances. Anatomic and physiologic knowledge of the thorax and its organs was vastly augmented, meanwhile, by the labor of the dissecting rooms and by such discoveries as that of William Harvey on the circulation of the blood and those of many physiologists and anatomists on the physiology of respiration.

With the nineteenth century came the two great innovations which were to give new life to the whole of surgery—anesthesia and asepsis. These greatly widened the scope of surgery of the thorax by allowing extensive operations on the chest wall and ribs, better management of some wounds of the chest, lung and heart, and better drainage of pleural fluid collections. Pneumothorax, though now no longer a surgical problem, was for decades a serious concern of the nineteenth-century surgeon. The procedure had been suggested by the Hippocratean school as a cure for pleurisy; from the sixteenth century onward, reports appeared advising the practice in cases of pulmonary tuberculosis or describing good results from chest wounds in tuberculous patients. In 1822, after extensive physiologic research, James Carson recommended artificial pneumothorax as a possible cure for pulmonary tuberculosis. His suggestion had little immediate effect—perhaps fortunately, since the aseptic technique had not yet been developed. During the decades that followed, numerous reports appeared describing cases of tuberculosis which were cured following spontaneous pneumothorax. At length, in 1882, Forlanini proposed the production of artificial pneumothorax, and in 1894 he reported on his clinical experience with the operation. Thoracoplasty for the release of a tuberculous lung was first performed in 1885 by De Ce'renville.

Surgery of the heart was even longer delayed. The ancients had believed all heart wounds necessarily fatal; Pare' was the first surgeon to realize that a heart injury might heal, and many reports of spontaneous recovery appeared in the ensuing centuries. As late as 1896, in the work which has been quoted, Paget wrote: "Surgery of the heart has probably reached the limits set by Nature to all surgery: no new method, and no new discovery, can overcome the natural difficulties that attend a wound of the heart." Yet the same year was to see the first successful suture of a stab wound of the heart, by Rehn.

Thus, at the very end of the nineteenth century, thoracic surgery, though still in its infancy, had made a few faltering steps forward, and the way was prepared for the amazing achievements which the past fifty years have seen.

—J. C. T.

Compulsory retirement.—We choose and select when we hire, and I see no reason why we cannot do the same thing when we retire our workers. In 1930 on the basis of a compulsory retirement rule, the most distinguished neurological surgeon the world has yet known, Harvey Cushing, was retired from the Harvard faculty at a time when he was at the peak of his ability. He promptly accepted a full time academic appointment at Yale where he continued his outstanding contributions to medical science. What was Harvard's loss was Yale's gain, but for Dr. Cushing the retirement rule meant only the waste of time and inconvenience of pulling up stakes, moving, and finding a new home. When Dr. Milton J. Rosenau, Professor of Public Health, was retired from the same faculty he, too, moved to another University where the rules were not so blind. From a sociological standpoint the whole thing is ridiculous, and a reflection on the state of our intelligence in solving what ought to be a simple problem. Whenever society adopts a rule that eliminates the fit with the unfit, destroys the good with the bad, or punishes the innocent with the wicked, it is not a good rule. Society progresses by changing rules of this kind. In an imperfect society human beings are pushed around by a faceless mob. But social progress may be measured in the last analysis by the degree of skill and discrimination with which society solves the individual problems of its members.—Theodore Klumpp: The Future of the Older Worker, Geriatrics 2:169 (May-June) 1947.

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PREVENTIVE MEDICINE AND VOLUNTARY HEALTH INSURANCE

Insurance of any kind is bought to cover the cost of an unpredictable financial catastrophe. Since the occurrence and duration of a severe illness cannot be anticipated, it is impossible to provide for it in the family budget, except by prepaid insurance. Our present Blue Cross plans and their additional benefit policies covering professional fees should undergo periodic scrutiny to make sure that they are fulfilling their purpose. The article on "The Integration of a Public Health Program with the Preventive Aspects of Private Practice," appearing in this issue, offers food for thought on the subject.

Syphilis and gonorrhea are as much acute infectious diseases as are tularemia and scabies; all are contracted by contact or touching. Why should acute cases of the former infections be excluded from treatment in a hospital if it is advisable? The moral stigma which society has attached to them because of their venereal mode of transmission should not be allowed to affect our scientific thinking. Adequate therapy early in the acute stage would prevent hospitalization later for treatment of complications or of the late lesions. Who can say whether pyelonephritis found at middle age resulted from an inadequately treated gonorrhea, a retrograde infection of the urinary tract with other pyogenic organisms, or a blood-borne embolic infection?

Penicillin offers a very efficacious mode of therapy for the acute case of syphilis or gonorrhea; treatment in uncomplicated early cases can be completed in an average hospital stay of three days for gonorrhea and fourteen days for syphilis. Therapy would be administered by the private physician and not by a governmental agency. The ability of the present system of medical practice to treat patients adequately would be demonstrated, and an argument for continuing the trend toward the socialization of medicine forestalled.

The Hospital Saving Association, in the last revision of its contract, has made a long-needed forward step. Payment for treatment of *mental illness* in a general hospital is now authorized. Prompt attack on acute mental disease, such as a toxic psychosis occurring during an intercurrent illness or during a drug intoxication, is now possible. Therapy with insulin or electric shock for the milder depressions, which are often recurrent or chronic, can be undertaken. The recognition that psychiatric patients are sick people who need and deserve hospitalization will make it possible in many instances to prevent commitment to a special institution. This extension of service will reduce the number of unnecessary admissions to our already overcrowded psychiatric hospitals, and will avoid delay in the treatment of patients who should be cared for promptly and in a general hospital.

Are facilities for the care of such patients being incorporated in the new general hospitals already authorized or planned under the Medical Care Program? Techniques are

known which allow rooms designed and built for the care of psychiatric patients to be promptly converted into ordinary hospital rooms. The Medical Care Commission and the Commissioner of Mental Hygiene should insist that such facilities be included when the buildings are constructed; such an opportunity to improve and extend the care of patients with mental illness will not recur for a generation. The people should be able to obtain the hospital care they need and pay for.

Hospitalization insurance does not pay for admissions for *diagnosis*. An exploratory laparotomy, however—whether or not an appendix is incidentally removed—is just as much a diagnostic procedure as is a gastrointestinal x-ray examination. The fact that supplementary policies covering professional fees pay *only* for surgical procedures results in much injustice. Better medical care would follow recognition of the fact that it is fair and just to pay for professional supervision of hospitalized patients with acute illness who are not operated upon.

Policies which pay professional fees to the surgeon only have increased the aura of glamour which surrounds him in the public eye. There are medical emergencies which are just as unpredictable and which carry just as high a mortality, if they are untreated, as do acute surgical conditions. Surely the proper treatment of coronary occlusion, bleeding peptic ulcer, diabetic coma, or tularemic pneumonia requires as much skill on the part of the physician as does a pelvic "house-cleaning" or a cholecystectomy. Recognition of this principle would enhance the prestige of the family doctor; he would then be on an equal footing with the surgeon in the eyes of the insurance company, and the insurance company helps to mold public opinion. Furthermore, abuse of the insurance principle will be prevented by curtailing unnecessary operations for "acute remunerative appendicitis," for example—operations performed to collect a fee which will cover unpaid-for office and hospital visits during an earlier attack of the same illness.

Large life insurance companies are conducting educational campaigns through lay magazines and the press to *prevent* disease in individuals. If life insurance companies accept as sound the principle of spending money for education, it would seem equally sound for hospital insurance companies to pay for *immunization*. An effective immunization program offers a more direct and sure return on the investment than does education. Such a program should encompass the needs of the entire family. It should include check-up tests on the effectiveness of the immunization procedures, and repetition of the procedures at necessary intervals. Prophylactic immunization would reduce the number of hospitalizations for acute infectious illnesses, and would lessen the severity—and hence the duration—of such illnesses if they were contracted. The cost of one hospitalization for pneumonia following whooping cough or influenza, or for Rocky Mountain spotted fever, would pay for thousands of doses of prophylactic vaccine or for hundreds of office visits to private physicians who would administer them.

The costs of such an immunization program are immediately and accurately calculable. A great service could be done the people of the state by the inclusion of such a program in the benefits of their hospital insurance. Many people would be immunized against preventable disease who do not now avail themselves of the free facilities of our public health agencies, and another argument for the necessity of socialized medicine would be spiked.

* * * *

A BOOST FOR GENERAL PRACTICE

Within the past year there have been many signs that the general practitioner is coming back into his rightful place as the most important man in medicine. One of the most unexpected bits of such evidence came from the class which graduated from the Bowman Gray School of Medicine of Wake Forest College in December, 1947. A poll of this class revealed that approximately three fourths of its members expect to become general practitioners. The class annual has as its theme the general practice of medicine. Embossed on its leather cover is an old doctor in a horse-drawn buggy. The first pages following the Introduction are devoted to actual photographs depicting scenes in the daily routine of two family doctors—fathers of two members of the graduating class. Both sons expect to follow in their father's footsteps.

The Introduction is quoted in full, because

it is so thought provoking, and so encouraging to those who believe that Osler was right when he said of the family doctor: "He is the standard by which we are measured . . . and the estimate of the profession in the eyes of the public is their estimate of him."

"In this bewildering world of haste and confusion the average person continues to turn to the family doctor for help in time of trouble. However, in the face of ever increasing demand for the services of the practicing physician, the number of men in private practice* is decreasing year by year. In many medical schools throughout the country it is no longer a question of whether a student will go into a specialty but rather which specialty or subspecialty he intends to follow. The student is so over exposed to specialists and researchers that he gets a distorted outlook on the practice of medicine from which he never recovers. He is so impressed with the recognition the specialists and researchers accord one another that he fails to realize that what is needed today is an application of the basic principles of modern medicine to the masses of people.

"The Class of 1947 of the Bowman Gray School of Medicine is proud that a majority of its members are headed for private practice.* The physician fathers of two of our members are shown on the following pages to illustrate, in part, the responsibilities of the family doctor."

* Editor's note: "Private practice" is used here to mean general or family practice.

* * * *

MORE BUREAUCRATIC PROPAGANDA

Last summer a House subcommittee headed by Representative Forest A. Harness rendered a distinct service to the nation by calling attention to the illegal use of federal funds "for propaganda activities supporting compulsory health insurance." The report of this committee—House Report No. 786—has been given wide circulation, not only in medical journals but in such lay publications as the *Reader's Digest*. It should do much to counteract the propaganda that continues to emanate from federal bureaucrats.

One of the most recent bits of bureaucratic propaganda is a book of 242 pages, published by Reynal and Hitchcock under the title, 140 MILLION PATIENTS, and retailing for $2.75. The jacket informs us that the author, Carl Malmberg, "has been a public relations advisor, information specialist for the United States Public Health Service and chief investigator for the United States Senate Subcommittee on Health and Education." The book carries on the back cover the hearty endorsements of Drs. Allan Butler, John Peters, Ernst Boas, and Channing Frothingham, and of Senator Claude Pepper.

Mr. Malmberg knows, of course, which side of his bread is buttered. In this volume he goes down the line with the familiar Falkian technique, which might be described as snooping, smearing, and sophistry.

The snooping consists in lifting from various reputable medical journals statements critical of American medicine. It is one of the glories of the medical profession that it has always cleaned its own house, and that medical leaders, editors, and authors have not hesitated to point out mistakes in medical practice. Such statements—often taken out of context—are used by Mr. Malmberg to smear the doctors of this country. A few sample headings will illustrate: "And the Poor Get Sicker," "'With the Help of the Lord and the Health Nurse,'" "The Cancer Patient in Blunderland," "Pernicious Anemia—Pernicious Treatment," "This Is Murder," "When Doctors Cause Disease," "Poison by Prescription," "'Hip-Pocket' Hysterectomies," "Other Unnecessary Surgery," *et cetera, ad nauseam!*

The sophistry lies in the "Prescription for Better Health." This, of course, is governmental control of medical practice, financed by compulsory health insurance—or, in plain English, by taxation. The arguments for this are the time-worn, threadbare ones that have been given over and over by Falk and his followers. Certain inconsistencies noted in Mr. Malmberg's book are also apparent in most of the other writings of this group. For example, the reader is told on page 183 that "Under a nation-wide health insurance plan, many more people would have free choice of physician than have it today"; two pages later he learns that "Freedom of choice and personal relationship between physician and patient play not the slightest part in much of the very best medical care received in this country."

The tenacity with which compulsory health insurance is adhered to by many close to Moscow gives point to the conclusion of the Harness Committee's report: "Suffice it at this time for your committee to report its firm conclusion, on the basis of the evidence at hand, that American communism holds this program as a cardinal point in its objectives; and that, in some instances, known Communists and fellow-travelers within the Federal agencies are at work diligently with Federal funds in furtherance of the Moscow party line in this regard."

Clinicopathologic Conference

BOWMAN GRAY SCHOOL OF MEDICINE OF WAKE FOREST COLLEGE

A 72-year-old woman was admitted to the urologic service of the North Carolina Baptist Hospital on July 6, 1947, and died on July 28. She first became acutely ill about twenty-four hours before admission, with fever, pain in the costovertebral angles, and hematuria. Prior to the onset of these symptoms she had had marked burning on urination, and frequency. On the day of admission she had many chills accompanied by high fever. The pain in the costovertebral angles and in the suprapubic region required Demerol for relief. The urine contained numerous blood clots.

The past history revealed that the patient had had previous attacks of pyelitis and pyelonephritis, and had had a bleeding peptic ulcer ten years before her present illness. The ulcer had been controlled by diet. Nothing else of significance was recorded in the history.

Physical examination on admission showed the temperature to be 102.4 F., the pulse 100, respiration 28, blood pressure 75 systolic, 50 diastolic. The patient was acutely ill and was somewhat confused mentally. The skin was hot, dry, and pale. No petechiae were noted, and there was no generalized lymphadenopathy. The pupils were equal, but were moderately dilated and reacted poorly to light; funduscopy showed numerous small white areas in the periphery but no hemorrhages. The trachea was in the midline and the thyroid was not palpable. There were a few moist rales in the bases of both lungs. Percussion showed the heart to be slightly enlarged to the left; the sounds were moderately loud, the rhythm regular. There was an occasional extrasystole, and a grade 2 systolic murmur was heard at the apex. The abdomen showed moderate generalized tenderness without spasm; the tenderness was greatest in the flanks and costovertebral angles, particularly on the left. There was also marked suprapubic tenderness. The peristaltic sounds were normal, and no abdominal masses were felt. There was no peripheral edema. Neuromuscular examination was recorded as being grossly negative except for a cloudy sensorium. Pelvic and rectal examinations were not done on admission. Later a prolapse of the uterus was noted.

Examination of the blood on July 8 showed the hemoglobin to be 19.3 Gm., the red cell count 6,200,000, the white cell count 32,500, with 64 per cent segmented polymorphonuclear neutrophils, 23 per cent non-segmented polymorphonuclear neutrophils, 1 per cent eosinophils, 7 per cent lymphocytes, and 5 per cent monocytes. On July 9 the hemoglobin was 16.5 Gm., the red cell count 5,600,000, the white cell count 8,850, with essentially the same differential. By July 15 the hemoglobin had dropped to 7 Gm., the red cells to 2,500,000. On July 25 the hemoglobin was 9 Gm., the red cell count 3,650,000. The white cell count continued to range between 13,000 and 17,000.

A specimen of urine obtained on admission was grossly bloody. A stained smear revealed gram-positive cocci and gram-negative rods. There were innumerable red blood cells and white blood cells. Urinalyses consistently showed a 2- to 3-plus reaction for albumin and a specific gravity varying between 1.013 and 1.021. On July 19 and July 25 urinalyses revealed 3 to 5 red cells and an occasional white cell per high power field.

The nonprotein nitrogen on admission was 74 mg. per 100 cc.; by July 10 it had fallen to 36 mg., and thereafter it varied between 31 and 66. The total serum proteins were 5.7 Gm. per 100 cc. on July 9. The carbon dioxide combining power ranged between 43 and 85 volumes per cent. Serum chlorides varied between 512 and 568 mg. per 100 cc. A urine culture made on July 6 revealed Escherichia coli and an intermediate coliform bacillus. A blood culture made on July 19 was reported as being sterile. The result of the Kahn test was not reported.

An x-ray of the chest on July 10 revealed arteriosclerotic changes in the aorta and moderate cardiac enlargement without characteristic configuration.

The patient was placed immediately on penicillin, receiving 240,000 to 400,000 units daily. The temperature dropped to normal by the third hospital day, but began to rise again on the fourth day, going as high as 104 F. on the seventh day. Penicillin was stopped on the fifth hospital day. Thereafter, the temperature varied between 99.4 and 103.6 F., although there were several temperature rises as high as 105 F. Streptomy-

cin in doses of 2 Gm. daily was begun on the eighth hospital day and discontinued two days later. Penicillin was resumed on the fourteenth hospital day in a dosage of 240,000 units daily; the temperature curve showed no response, however, and penicillin was stopped after four days. It is not recorded whether the blood which was taken for culture on July 19, 1947—the day that penicillin was started the second time—was taken before or after the first dose of penicillin. In any event, the culture was sterile.

On July 7 the patient vomited coffee-ground material which was benzidine-positive. On the same day it was found that she had auricular fibrillation, with a pulse rate of 110. The point of maximal impulse was in the anterior axillary line. Blood pressure was 80 systolic, 40 diastolic. The lung bases were full of moist rales. On July 8 the patient was given 1.25 mg. of digoxin intramuscularly; the heart rhythm reverted to normal late that night. The urinary output had remained fairly good after the first few days in the hospital.

The patient remained somewhat stuporous, and again vomited blood on July 12. On July 15, after a dose of streptomycin, the patient suddenly went into shock and her blood pressure was unobtainable. There was moderate muscular rigidity with some twitching. At this time the hemoglobin was 7 Gm. Enema returns had been black, and it was thought that the patient must be having massive gastrointestinal hemorrhages. She again vomited blood on July 16. Several small blood transfusions were given. On July 19 she became comatose and was unable to take nourishment by mouth; fluids were given parenterally. On July 24 moderate palpebral edema and edema of the legs began to develop. On July 28 her temperature went to 106.2 F. rectally; the radial pulse and blood pressure were not obtainable, and the patient died at 8:25 a.m.

Discussion

DR. GEORGE T. HARRELL: In summary, this is the story of an acute fatal illness of twenty-three days' duration in a 72-year-old woman. It was characterized by fever, chills, pain in the costovertebral angles, burning and frequency of urination, and the passage of blood clots in the urine. It would be helpful to know whether this was an acute exacerbation of a pre-existing disease and whether there had been weight loss or a gradual down-hill course.

The past history suggested a bleeding ulcer ten years previously, but there is no mention of any subsequent symptoms. Recurrent attacks of pyelitis and pyelonephritis are described, but we are not told when the last attack occurred. This information casts little light on the present illness. No marital history is recorded, but since a prolapse of the uterus is described the patient probably had had children. One wonders if the prolapse might have been due to the birth of an unusually large child, such as patients with diabetes are apt to have.

The physical examination showed hypotension, mental confusion, and a hot, dry and pale skin—a finding which one would not expect in view of the laboratory data. No evidence of weight loss is mentioned. The pupils reacted poorly, and white areas were found in the fundi. A more detailed description of these lesions—whether they appeared to be old scars, whether they were smooth, round, and raised as a tubercle might be, whether they were small or large, and whether they bore any relation to the blood vessels—would be valuable. We do know that they had no surrounding hemorrhage. The rales heard in the lungs on admission progressed to frank congestion; atelectatic rales are not uncommon in acutely ill elderly patients who are confined to bed. The heart was enlarged to percussion, and auscultation revealed extrasystoles and a systolic murmur at the apex; fibrillation and frank congestive failure developed later. The abdomen was tender, but there was no loss of peristalsis and no masses were present. The costovertebral angles were tender, the left more so than the right. A prolapse of the uterus was noted, but no ulceration or bleeding from the cervix is described.

The fever responded to the administration of penicillin for three days, but recurred while the patient was still on the drug. We are told that she vomited coffee-ground material and blood, but the quantity and color of the blood are not described. If the patient was not taking iron, the black stools probably resulted from the digestion of blood entering the upper intestinal tract. The development of auricular fibrillation and congestive failure was accompanied by rales in the lungs and edema of the legs; the edema

of the eyelids which was described does not ordinarily occur with congestive heart failure. The patient continued to be stuporous, but suddenly went into shock accompanied by rigidity of the muscles and twitching. She died in coma with a high temperature. This course suggests a rapidly progressing acute infection, though it is difficult to fit all of the findings into a single diagnosis.

Anatomically one would expect bilateral lesions in the kidneys, most marked on the left[1]. Nephritis can be ruled out on the basis of the blood pressure, the findings in the eyegrounds, and the nonprotein nitrogen. Polycystic disease of the kidney—a cause of massive hemorrhage—usually occurs in the fourth or fifth decade and is accompanied by signs of uremia.

There is evidence of disease of the mucosal surface of the upper gastrointestinal tract, probably in the stomach or duodenum, but no evidence of involvement of the peritoneal surface.

The central nervous system is involved, but the neurologic signs do not allow localization of a specific lesion; the involvement was probably diffuse and on a toxic basis, though a terminal cerebral accident must be kept in mind. A lumbar puncture would have shed light on this possibility.

Disease of the circulatory system was evidenced by a disturbance of rhythm resulting in myocardial failure. An anatomic lesion is rarely demonstrated in cases of myocardial failure resulting from disturbances of rhythm. The systolic murmur in the presence of high fever would suggest an acute bacterial endocarditis, but the absence of petechiae, a palpable spleen, a changing quality to the murmur, or positive blood cultures does not support this diagnosis. The systolic murmur in the presence of cardiac failure may have been due to dilatation. The persistent peripheral vascular collapse suggests the possibility of bilateral adrenal cortical involvement.

The diagnosis of a blood dyscrasia involving the bone marrow or lymphoid tissue is not justified by the physical and laboratory findings.

Etiologically gross hematuria most frequently results from infection—usually tuberculous—or from malignancy. Gram-negative bacilli and gram-positive cocci were stained in the urinary sediment, though only Escherichia coli were grown on culture. Acid-fast stains of the urine are not described; no lesions which would support an impression of tuberculosis are described in the chest x-ray. The single blood culture was taken late in the course of the disease, and after the initiation of penicillin therapy; either of the urinary organisms might be inhibited by the antibiotic and not grow out in the blood culture.

The clinical response to penicillin and the marked improvement in the findings in the urinary sediment would suggest that the organisms discovered in the urine responded to therapy. Whether these were primary or secondary invaders is difficult to say. The fact that the infection did not remain under control would suggest that they were secondary invaders and not the primary cause of the disease. Invasion from an infection outside the urinary tract is not supported by the physical or laboratory findings, however. The primary invader did not appear to respond to streptomycin, though the quantity given was inadequate to achieve a therapeutic response if the infection was due to the tubercle bacillus.

An infection which does not show the expected response to therapy suggests the possibility of a metabolic disturbance interfering with the immune response. Diabetes is known to aggravate infections with the tubercle bacillus and staphylococcus, and to predispose the patient to urinary tract infections. A very slight suspicion of the presence of diabetes might arise from the prolapsed uterus, as well as from the marked dehydration noted on admission. It would be interesting to know whether there was any history of boils or excoriations of the vulva, what the blood sugar was, and whether sugar was found in the urine.

The most common malignancy resulting in hematuria is carcinoma of the kidney. Hypernephroma may also cause gross hematuria and high fever, even in the absence of metastases. The bilateral symptoms would seem to weigh heavily against a malignancy, since primary tumors of the kidney are almost always unilateral. If cystoscopy had been possible, it would have shown whether the bleeding was actually bilateral; unilateral bleeding would be much more suggestive

1. (a) Cahill, G. F.: Hematuria: Its Clinical Significance, J. Urol. 47:224-234 (March) 1942; (b) Gomberg, D.: Hematuria, North Carolina M. J. 7:213-215 (May) 1946.

of tumor. Hypernephroma would be likely to cause metastases of the lungs, but no "golf ball" lesions are described in the lung fields. Malignant metastases to the mucosal surface of the stomach are very rare.

It is a moot point whether chronic peptic ulcer of long duration will become malignant. In any event, metastases to the kidney from a carcinoma of the upper gastrointestinal tract, without other evidence of metastases, would be very rare. Carcinoma of the uterus, which is common in women who have borne children, is not supported by the description of the prolapsed uterus. Carcinoma of the breast—one of the most common sites of malignancy in women—is not supported by the physical examination or by laboratory evidence of metastases. A very tiny primary lesion in the breast, however, may cause widespread miliary metastases, producing the picture of septicemia with high fever and bleeding from involvement of the bone marrow.

Physiologically the disease produced marked dehydration, as is shown by the hemoglobin and the red and white blood cell counts, which were unusually high in spite of the pallor. It is difficult to estimate the degree of dehydration without knowing the amount of fluids given and the urine volumes in the first few days, as well as the hematocrit values. The hemoglobin dropped to 7 Gm. and the red cell count to 2,500,000, but it is impossible to tell how much of this fall was due to hydration and how much to bleeding. The fact that the nonprotein nitrogen dropped from 74 to 36 mg. per 100 cc. with hydration seems to rule out nephritis; the subsequent rise to 66 mg. per 100 cc. could be due to low filtration pressure from chronic circulatory failure, or to bleeding into the gastrointestinal tract.

The laboratory findings do not suggest that interference with the clotting mechanism was the basis for the blood loss, though there is no mention of abnormal cells, a platelet count, a prothrombin determination, or a tourniquet test.

Though the total serum proteins are listed as 5.7 Gm. per 100 cc., the persistent finding of a 2- to 3-plus reaction for albumin in the urine and the development of palpebral edema would suggest a mild hypoproteinemia late in the course of the disease. If the carbon dioxide combining power of 43 volumes per cent were found after the administration of fluid, a preceding acidosis might be suspected and would lend a little support to the suspicion of diabetes. The rise to 86 volumes per cent after vomiting would suggest the loss of free hydrochloric acid from the stomach with resultant alkalosis; the presence of such a degree of hydrochloric acid would favor a benign rather than a malignant ulceration in the upper gastrointestinal tract. The low blood chloride level is further evidence of dehydration and acidosis such as might occur in diabetes.

The differential diagnosis appears to rest between tuberculosis of the kidney, with terminal miliary spread, and carcinoma of the kidney. The apparent absence of symptoms before the fatal illness seems to indicate that the gastrointestinal bleeding was not connected with the primary disease process and arose from some site other than the old peptic ulcer[2].

Dr. Harrell's diagnoses

1. Miliary tuberculosis with invasion of the kidneys and adrenals, and cerebral involvement, in a patient with mild diabetes; or, as an alternate diagnosis, carcinoma of the kidney, with the breast as the second most likely primary site.
2. Chronic pyelonephritis, mixed flora.
3. Chronic duodenal ulcer, inactive, with bleeding from some other site in the gastrointestinal tract.

DR. FRED K. GARVEY (*Urologist*) : Massive hematuria without previous signs or symptoms is most often thought to be from neoplasm. Identical bleeding may occur with calculus, tuberculosis, trauma, and even simple urinary infection, but usually the history in such cases points more specifically toward one of the latter diseases. Renal tumors are more apt to cause massive hemorrhage than is tuberculosis or calculi, but the latter conditions, since they are much more common than tumor, are responsible for more cases of massive hematuria. In the event of gross hematuria without bladder symptoms, the decision as to whether the lesion is in the upper or lower urinary tract depends considerably on the presence or absence of pain referable to the upper urinary tract.

Occasionally worm-like clots of blood,

2. (a) Jankelson, I. R. and Segal, M. S.: Massive Hemorrhage from Peptic Ulcer, New England J. Med. 219:3-5 (July 7) 1938; (b) Jankelson, I. R.: Massive Hematemesis of Undetermined Origin, Gastroenterol. 5:96-101 (Aug.) 1945.

which are casts from the ureter, will be found in the urine. Such clots are pathognomonic of bleeding from the upper urinary tract, and quite commonly produce pain or mild colic.

Bilateral flank pain with gross hematuria usually suggests bilateral involvement, and would cause one to suspect the more common diseases such as calculi or simple inflammation rather than renal tumor, which rarely is bilateral. On the other hand, however, it is possible for pain in one kidney to produce, by crossed renal reflex, some degree of pain in the opposite organ.

In a patient of this age, without a previous history of stones or tuberculosis, a renal neoplasm must be strongly considered. The pain in the involved kidney could be explained by clots blocking the ureter, and the pain in the opposite side could be due to a crossed renal reflex or to pyelonephritis. The latter mechanism is suggested by the pyrexia which this patient had.

DR. MACDONALD FULTON (*Bacteriologist*): The direct smears of urine sediment showed gram-positive cocci and gram-negative bacilli, but on culture only the bacilli grew. It is possible that the culture medium chosen was one which would grow the gram-negative bacilli, but would tend to inhibit the cocci. Media commonly used to grow coliform bacilli inhibit or greatly retard the growth of most cocci. This fact should be taken into account in deciding what media to employ in making urine cultures. It is important in choosing therapy to know whether a urinary infection is pure or mixed bacteriologically.

DR. DAVID CAYER (*Internist*): In view of this patient's extremely critical condition throughout her hospitalization, no accessory studies could be attempted to demonstrate the actual site of the gastrointestinal bleeding. Clinically, however, it appeared to be from the upper gastrointestinal tract. On a statistical basis, peptic ulceration would be most likely, even in a patient of this age. The demonstration of free hydrochloric acid in the aspirated material, as well as the past history of ulcer, would also be in favor of this diagnosis. Carcinoma of the stomach should not be overlooked, however, and it is possible for both ulcer and cancer to occur in the same patient over a period of years. The possibility of malignant change in a pre-existing benign ulcer is unlikely. Most internists feel that benign peptic ulcerations rarely become malignant, and that the mortality from cancer of the stomach among patients with ulcer is less than that among the general population.

I agree with Dr. Harrell that a metastatic lesion from the kidney to the mucosa of the gastrointestinal tract is most unlikely.

DR. WILLIAM WOLFF (*Clinical Chemist*): The high nonprotein nitrogen noted on admission probably represents dehydration with nitrogen retention which cleared up as the fluid balance came back to normal. The subsequent rises in the nonprotein nitrogen may well have been the result of massive hemorrhages into the gastrointestinal tract. Recent reports in the literature suggest that a rise in nonprotein nitrogen may be expected following the introduction of 500 to 800 cc. of blood into the intestinal tract.

Anatomic Discussion

DR. W. C. THOMAS: The principal findings at the postmortem examination were in the heart, esophagus, and left kidney. The annulus fibrosus of the mitral valve of the heart showed thickening and calcification[3]. A large, friable vegetation was noted on the mitral valve. Cultures of the vegetation and of the blood revealed a pure growth of Esch. coli. Gram-stained sections of the vegetation showed gram-negative, rod-shaped organisms. Embolic phenomena were present in the spleen, kidneys, skin and conjunctivae[4].

The distal half of the esophagus was noted to be thickened and the mucosa was ulcerated[5]. The microscopic sections showed subacute and acute inflammation.

A light gray, well vascularized, circumscribed mass 5 cm. in diameter occupied the upper pole of the left kidney[6]. No metastases were found in the other tissues of the body.

Anatomic Diagnoses

1. *Calcification of the mitral annulus fibrosus.*

2. *Acute bacterial endocarditis, mitral*

3. Rytand, D. A. and Lipsitch, L. S.: Clinical Aspects of Calcification of the Mitral Annulus Fibrosus, Arch. Int. Med. 78:544-564 (Nov.) 1946.
4. Zeman, F. D. and Siegal, S.: Acute Bacterial Endocarditis in the Aged, Am. Heart J. 29:597-610 (May) 1945.
5. Friedenwald, J., Feldman, M. and Zinn, W. F.: Peptic Ulcer of the Esophagus, Am. J. M. Sc. 177:1-14 (Jan.) 1929.
6. Creevy, C. D.: Confusing Clinical Manifestations of Malignant Renal Neoplasms, Arch. Int. Med. 55:895-916 (June) 1935.

valve, due to Esch. coli, with infarctions of spleen and kidneys, petechiae of skin and conjunctivae, acute hepatitis, and acute splenitis.

3. *Ulcerations of the esophagus,* with acute and subacute inflammation.

4. *Carcinoma of the kidney,* left, with ulceration of the mucosa of the renal pelvis.

Closing Discussion

DR. HARRELL: This case teaches two lessons: (1) the value of relatively simple bacteriologic studies, and (2) the inadvisability of attempting to analyze minutely a poor history. In the absence of an accurate detailed history it may be wiser to assume as a working diagnosis that the lesion most probable on a statistical basis is present. In this case unquestionably it would have been carcinoma of the kidney, because of the patient's age and the sudden onset of urologic symptoms with bleeding.

Repeated early blood cultures should certainly have found the colon bacillus and could have led to the correct interpretation of the heart murmur as due to acute bacterial endocarditis. This finding would have been important in planning therapy; it might have made it possible to improve the patient's condition sufficiently to allow additional diagnostic studies which would have resulted in operative attack on the primary disease process. The absence of demonstrable metastases would lead one to believe that a good operative result might have been obtained.

The ulceration in the esophagus brings to mind the danger of long continued use of an indwelling stomach tube.

VITAL STATISTICS FOR 1946

The year 1946 marks a new record low for the crude death rate in the United States, according to figures of the National Office of Vital Statistics. The death rate for the year was 10.0 per 1,000 population as compared with the rate of 10.6 for 1945 and the previous lowest rate of 10.4 in 1942. The total number of deaths in 1946 was 1,395,617—6,102 fewer than in 1945.

The estimated death rate for the United States in 1947, based on data for the first ten months of the year, was 10.1.

The five leading causes of death in the United States in 1946 in rank order were diseases of the heart, cancer, intracranial lesions of vascular origin, nephritis, and accidents other than motor vehicle accidents. This is the first year in which pneumonia and influenza (combined) were not represented among the five leading causes of death.

MEDICOLEGAL ABSTRACT

J. F. OWEN, M.D., LL.B.
RALEIGH

WORKMEN'S COMPENSATION ACT: *An injured employee is awarded compensation if the injury occurs by accident, and arises out of and in the course of employment.*

An employee of a publishing company sustained an injury to his back on February 3, 1947. At the time of the injury he was in the act of lifting a plate weighing 40 or 50 pounds for the purpose of passing it to the pressman. He had been doing the same type of work, as the necessity arose, over a period of two and a half months. The act consisted in bringing the plate upward to the proper height, extending the left foot forward, twisting the body slightly to the right, and placing the plate in the pressman's hands. No ill results had been felt until the date noted above. The pain came on suddenly and was excruciating. There was some reference to the employee's having had previous trouble with his back, such as weakness, pain, and "catches" at intervals.

Two days after the injury occurred the employee consulted a physician, who strapped the area and treated the case as a sprain. On March 7, 1947, he consulted another doctor, who made a diagnosis of rupture of an intervertebral disc. An operation for the relief of the condition was performed on March 14. The patient continued disabled until June 10.

At a hearing before a representative of the Industrial Commission the employee was awarded compensation. The insurance carrier and employer then appealed to the superior court, where the judgment of the Commission was affirmed. The defendants then brought the case to the Supreme Court for final disposition.

The employer and carrier urged that there was a weakness of the back existing before the acute onset, and that, while the injury occurred in the course of the employee's work, it was not due to accidental causes. The issue, therefore, when the case came to the Supreme Court, was whether inherent weakness or accident was responsible for the disability. The Court had to determine just what unusual movement of the body occurred

at the time of the injury which had not happened during the preceding two and a half months, when the employee had been performing the same act without any signs of injury.

The Supreme Court defines an "accident" within the meaning of the Workmen's Compensation Act to be "an unlooked for and untoward event, not expected or designed by the injured employee, a result produced by a fortuitous cause, or an unexpected, unforeseen, or undesigned occurrence."

Upon the basis of the facts adduced at the hearings and according to the definition of accident noted above, the court ruled that the injury was caused by accident and arose out of and in the course of the employee's work. The employee was well before he lifted the plate; during the act he was stricken by violent pain. Therefore it was assumed that the act was the causative factor in the production of the injury complained of.

In such cases as the above, the physician, as an expert witness of fact or one who gives opinion evidence only, is the only person who can furnish information acceptable for arriving at an equitable decision. Upon the basis of his knowledge of anatomy and other medical information, he should be able to outline the mechanics of physical disability so as practically to remove the solving of such problems from the realm of conjecture. In this way he would not only aid the courts but would ensure justice to claimants and employers as well. (Supreme Court of North Carolina, V. 41 S.E.R., p. 592, March, 1947)

The medical profession's role in lowering the cost of hospital care.—An important, if not the most important, factor in the development and final success of any plan conceived and adopted by hospitals for the more efficient and less costly care of sick patients will depend on the interest and cooperation of the medical profession. Who, for example, shall decide whether a patient requires special attention or not? Surely not the hospital administration alone. You, the physician, better than anybody else know the condition of each patient, and extra services to those patients (exclusive of the luxury group) must be determined not on the wishes of patients or their families but on the condition of those patients in their relation to the routine service that your hospital is able to give. Therefore, with the changing concept of what is best and most efficient for the care of our patients, let us take an active, aggressive and cooperative part in the development and execution of any constructive program that our hospitals may choose to establish.—Leland S. McKittrick: Medical Care in Our Free Society, New England J. Med. 236:923 (June 19) 1947.

PUBLIC RELATIONS

Editor's Note: This is the first in a series of articles to be sponsored by the Public Relations Committee of the Medical Society of the State of North Carolina. Dr. Donald Koonce of Wilmington is chairman of this committee.

THE NEED FOR BETTER PUBLIC RELATIONS

The first article in this series on public relations was to have been written by President Frank Sharpe. After his sudden and untimely death, Chairman Donald Koonce asked me to accept the assignment.

No one strove harder for better public relations than Frank Sharpe. He literally gave of himself beyond the point of physical endurance. No task was too menial or too big for his personal effort. His soul was filled with the "milk of human kindness" and a desire to serve his fellow man. It is, therefore, with great humility that I serve as his substitute. I bespeak charitable and tempered judgment of what follows.

First, what are "good public relations?" I would say that they are the efforts of organized medicine to conduct its affairs and to publicize its conduct so as to gain the confidence, respect and good will of the public.

Have our public relations, then, been good in recent years? I do not think so. In fact, I question whether they could have been much worse.

The truth of that statement is reflected in the harsh and often false criticisms hurled at us by the propagandists appearing before the Senate Committee conducting recent hearings on the Wagner-Murray-Dingell Bill. The statement was often made that there were 5,000,000 men rejected by the draft boards, the implication being that these rejections were due to remediable defects and that the medical profession had been woefully derelict in not having long before corrected them. You and I know that a large number of these rejections were for congenital defects, wholly beyond our control—for example, eye defects, mental defects, deaf-mutism, orthopedic deformities, and hernias. Add to this number the rejections for disabilities acquired by reason of accident, such as amputations and blindness, and

the number of rejections for remediable defects is not 5,000,000, but only about 1,500,000[1]. Moreover, these rejections were made under the strictest physical requirements of any army in the world. This propaganda is only part of a planned and deliberate attack on free medicine with no holds barred[2].

The need for good public relations on an organized basis is at once seen. We can no longer afford to ignore the challenge, regardless of the source of that challenge. Suffice it to say that it emanates from a well-organized minority with but one intent: the regimentation of medicine as the keystone of the arch of an all-powerful, dictatorial government.

Let us be completely candid with ourselves, however. All criticism does not emanate from an organized minority. There is at least one individual in any lay group of ten to fifteen people who thinks he has been overcharged by a doctor or in some other way mistreated. Just start a discussion on socialized medicine in such a group and see how quickly the sparks fly. We can no longer ignore this trend in public opinion. We must meet it with constructive effort and direction. The best defense is a positive offense.

We need, perhaps, to do a little soul-searching of ourselves individually. Are we furnishing leadership in our local communities? Could we give a little more time, thought, and money to worthy causes? Are not our responsibilities the same as any other citizen's? I know that there are many beloved and respected doctors over this state, but should there not be more such men? Have we gotten away from some of the finer traditions of medicine? Each doctor can answer these questions for himself.

Nevertheless, there is no question about the past record of American Medicine. It is one in which we can well take superlative pride. Let us, as members of organized medicine, tell it to the world! Let us fight back, secure in the strength of truth. Let us rededicate ourselves to those traditions of medicine which have always called forth the best within us. And, lastly, let us not be afraid to introduce any innovations of practice necessary to meet modern conditions—always, however, under our leadership, direction, and control.

I believe, then, that good public relations will follow. Such men as Frank Sharpe will not have lived in vain.

V. K. HART, M.D.
Charlotte

1. See statement before the Senate Committee on Education and Labor by Dr. Harold T. Low, then president of the Association of American Physicians and Surgeons, April 18, 1946.
2. See "Our Most Dangerous Lobby" by Congressman Forest A. Harness in December number of Reader's Digest.

TUBERCULOSIS ABSTRACTS

A Review for Physicians

Issued Monthly by the National Tuberculosis Association

Vol. XXI **January, 1948** **No. 1**

THERE probably never has been a period when a clear understanding of "activity" in tuberculosis was more important than now. The use of the miniature film technique by the military services and in industrial and community surveys has made the public "chest X-ray conscious." In mass X-ray surveys of apparently healthy groups, the majority of the cases of tuberculosis discovered are neither obviously active nor obviously healed but require extended study and observation to determine the presence or absence of activity.

THE DIAGNOSIS OF ACTIVITY IN PULMONARY TUBERCULOSIS

There is no single word in the vocabulary of clinical tuberculosis more widely employed nor more widely misunderstood than the word "activity." The ancient fallacy still persists that rales arise in moisture, which signifies inflammation and hence, activity. Another more dangerous fallacy is that activity is usually accompanied by slight changes in temperature, pulse, weight, appetite and physical energy.

The two essential requirements of a scientifically sound and clinically useful concept of activity are that it must be securely based on the anatomic state of the tuberculosis lesion and must also be synonymous with need for treatment. Such a concept must include three distinct groups of cases: those which show anatomic progression; those which are anatomically stationary but not healed; and those which are retrogressive but not yet safely healed.

In determining whether or not a case requires treatment, the symptoms, physical signs, laboratory data, and X-ray picture may all be used—or misused.

The symptoms of pulmonary tuberculosis are familiar to all physicians. When a group of them is present there is usually no doubt about activity. When only one or two of them are present they may be erroneously attributed to the minimal lesion shown in the X-ray film. Serial films are the only safeguard against this error.

A more common and more serious error is to exclude activity because of the absence of symptoms. It cannot be emphasized too strongly that tuberculosis, both in its onset, and during the early period of relapse, is characteristically a symptom-free disease. To depend upon symptoms, or to await the development of symptoms, is to lose the most favorable moment for treatment. Surveys have shown that when the diagnosis is based upon symptoms, 87 per cent of the cases will have advanced disease. Increasing numbers of hospital beds are filled with patients whose symptom-free, early disease was discovered in a survey or induction examination a year or so earlier, but who refused treatment and continued to work until they felt sick and had advanced disease. The public requires education on this matter; let us hope that most of it will be forthcoming from physicians.

Physical signs are of still less value than symptoms in determining activity. Inspection, palpation, and percussion are not to be trusted and auscultation is but little better. Coarse, or moderately coarse, moist rales, do usually indicate activity. They are often absent, even in far-advanced disease. Conversely, rales of the fine, or moderately coarse, dry type are often present throughout the entire life of a person with well-healed tuberculosis.

Like symptoms and physical signs, the laboratory helps us out by confirming a suspicion of activity, but does not exclude it. The finding of tubercle bacilli in the sputum, or in the gastric contents is always an indication for treatment and careful search should never be neglected.

Blood studies as a guide to activity are of little use to the doctor in practice. Most clinicians agree that the X-ray picture is a more accurate, sensitive, and dependable barometer of intrapulmonic weather than the blood picture.

The superiority of the X-ray film over other guides to activity in pulmonary tuberculosis makes it important that we recognize its limitations and use it to the greatest advantage. It requires little experience for anyone to learn to recognize the "soft" shadows, with indistinct borders which signify the active exudative, pathological reaction, and the "hard" shadows, partly or largely linear and with sharply defined borders, which signify a well-healed fibrotic reaction. Between these two extremes is a large group of cases in which the most experienced and expert interpreter will be unable to differentiate active from inactive disease by a single film. In these cases there is no substitute for the careful and detailed comparison of serial films made at intervals of one to three months.

In making comparisons of films it is important to keep in mind certain sources of error. The degree of exposure, the depth of inspiration and position of the patient in relation to the cassette may give illusory effects if the films being compared are not carefully checked for these factors. Slight differences in projection angles or changes in the position of the clavicles may reveal shadows which were partially concealed in the earlier film, thus giving the illusion of progressive disease or **vice versa.**

The Diagnosis of Activity in Pulmonary Tuberculosis (with case reports and illustrative films), Raymond C. McKay, M.D., Postgraduate Medicine, May, 1947.

Schering Introduces Micropellets Progynon

Pure micro crystals of alpha estradiol, when suspended in normal saline solution provide an immediate and prolonged effect upon intramuscular injection. Consequently, to meet many requests for an aqueous estrogen of this type, Schering Corporation of Bloomfield and Union, N. J., has introduced Micropellets Progynon. In this product the water is absorbed and the Micropellets remain in the tissue with all the advantages of a pellet implantation. Freedom from the pain of injection, which is an objection to other suspensions of large crystals or bulky amorphous masses, is assured when these tiny Micropellets are employed.

Lonalac for Diets of Restricted Sodium Content

Lonalac, nutritionally similar to whole milk powder but virtually free of sodium, aids in the maintenance of protein nutrition when milk, meat, eggs and cheese must be restricted. Congestive heart failure, hypertension and toxemia of pregnancy have been treated with low sodium diets. Sodium analyses of foods, diet plans, literature on uses of low sodium diets and samples of Lonalac are available from: Mead Johnson & Co., Evansville 21, Indiana.

Dr. Gray Is Parke-Davis Medical Consultant

Announcement that Dr. J. P. Gray has joined the staff of Parke, Davis & Company in the capacity of Medical Consultant to the Sales and Promotion Division has been made by Harry J. Loynd, vice president of the company.

Dr. Gray has served as dean of the School of Medicine of the Medical College of Virginia in Richmond.

SITUATION WANTED

New York physician (general practitioner) desires to locate in North Carolina. Willing to assist or become associate. Age 32, married, veteran, licensed to practice in North Carolina.

Address "F"
Post Office Box 456
Winston-Salem, N. C.

DOCTOR WANTED

The town of Waxhaw in Union County is without a doctor. A physician locating in Waxhaw would serve between 5000 and 6000 people and would have the facilities of the hospital in Monroe, twelve miles distant, at his disposal. A registered pharmacist has agreed to come to Waxhaw if a doctor will locate there.

Anyone interested should write Mr. Robert Howie, Waxhaw, N. C.

BULLETIN BOARD

Medical and Surgical Symposium of Watts Hospital

The Fifth Annual Medical and Surgical Symposium of Watts Hospital will be held Wednesday and Thursday, February 11 and 12, 1948, in Durham, N. C.

The headquarters for the Symposium will be at the Washington Duke Hotel, where the various luncheons and dinners will be served with the exception of the annual barbecue dinner at Watts Hospital, Wednesday evening, February 11. The entire scientific program will be conducted in the Carolina Theater, which is approximately half a block from the Washington Duke Hotel. The program is as follows:

Wednesday, February 11

11:00 A.M.—1:00 P.M. — Clinico-Pathological Conference—Virgil H. Moon, M.D., Professor of Pathology, Jefferson Medical College, Philadelphia, Pennsylvania; and Garfield G. Duncan, M.D., Director of the Division of Medicine, Pennsylvania Hospital, and Clinical Professor of Medicine, Jefferson Medical College, Philadelphia, Pa.

2:30 P.M.—"The Clinical Use of Endocrines in the Management of Urogenital Tract Disease"—Reed M. Nesbit, M.D., Professor of Surgery, University Hospital, Ann Arbor, Michigan.

3:30 P.M.—"Recent Advances Concerning Coronary Heart Disease"—Louis N. Katz, M.D., Director of Cardiovascular Research, Michael Reese Hospital, Chicago, Illinois.

8:00 P.M.—"The Diagnosis of Pituitary Disease"—Lewis M. Hurxthal, M.D., Chief of the Medical Service, Lahey Clinic, Boston, Mass.

9:00 P.M.—"Pathogenesis and Treatment of Malignancy of the Large Bowel"—Richard B. Cattell, M.D., Surgeon-In-Chief, New England Deaconess Hospital; Surgeon, New England Baptist Hospital; Surgeon, Lahey Clinic, Boston, Mass.

Thursday, February 12

11:00 A.M.—1:00 P.M.—Clinico-Pathological Conference—Tracy B. Mallory, M.D., Director of the Laboratories of Pathology and Bacteriology, Massachusetts General Hospital, Boston, Massachusetts; and Conger Williams, M.D., associate of Dr. Paul White in the Cardiologic Group, Massachusetts General Hospital, Boston, Massachusetts.

2:30 P.M.—"Anticoagulant Therapy"—Nelson W. Barker, M.D., Associate Professor of Medicine, Mayo Foundation, Rochester, Minn.

3:30 P.M.—"Shoulder and Arm Pain: Diagnosis and Treatment"—Ralph K. Ghormley, M.D., Professor of Orthopedic Surgery, Mayo Foundation, Rochester, Minn.

8:00 P.M.—"Treatment of Diabetes in Every Doctor's Practice"—Elliott P. Joslin, M.D., Professor Emeritus, Clinical Medicine, Harvard Medical School, Boston, Massachusetts.

9:00 P.M.—"Recent Nutritional Advances in Medicine and Surgery"—Paul R. Cannon, M.D., Professor of Pathology, University of Chicago, Chicago, Illinois.

Postgraduate Courses in Medicine

Sponsored by the School of Medicine and the Extension Division of the University of North Carolina

Raleigh

March 2: Antibiotic Therapy from the Standpoint of the General Practitioner—Dr. Chester Keefer, Boston University School of Medicine, Boston.

March 9: Surgical Emergencies of Infants and Children — Dr. Thomas H. Lanman, Harvard Medical School, Boston.

March 16: Differential Diagnosis of Biliary Tract Diseases—Speaker to be announced.

March 23: Psychosomatic Medicine—Dr. Kenneth E. Appel, University of Pennsylvania School of Medicine, Philadelphia.

March 30: Cancer; Recent Developments in Etiology and Diagnostic Methods—Dr. George Z. Williams, Medical College of Virginia, Richmond. (North Carolina Chapter of American Cancer Society, Co-Sponsor)

April 6, 4:00 P.M.: Problems in Obstetrics from the Standpoint of the General Practitioner.
8:00 P.M.: Office Gynecology from the Standpoint of the General Practitioner
Dr. Edward A. Schumann, Philadelphia.

April 13: Recent Advances in Etiology and Treatment of Poliomyelitis—Dr. Philip M. Stimson, College of Physicians and Surgeons, Columbia University, New York City. (National Foundation for Infantile Paralysis, Co-Sponsor)

Greensboro—High Point

March 3, Greensboro, 4:00 P.M.: Recent Advances in Pediatric Therapy
8:00 P.M.: Chronic Malnutrition in Children
Dr. Charles F. McKhann, Western Reserve University School of Medicine, Cleveland.

March 10, High Point: Cancer of the Breast—Dr. Charles F. Geschickter, Baltimore, Maryland. (North Carolina Chapter of American Cancer Society, Co-Sponsor)

March 17, Greensboro: Medical and Surgical Management of Cardiovascular Disease
4:00 P.M.: Peripheral Vascular Disease
8:00 P.M.: Hypertension and Hypertensive Heart Disease
Dr. Robert W. Wilkins, Boston University School of Medicine, Boston.

March 24, Greensboro: Psychosomatic Medicine—Dr. L. A. M. Krause, University of Maryland School of Medicine, Baltimore.

March 31, High Point, 4:00 P.M.: Diseases of the Liver and Pancreas
8:00 P.M.: Diseases of the Stomach and Duodenum
Speaker to be announced.

April 7, Greensboro, 4:00 P.M.: Problems in Obstetrics from the Standpoint of the General Practitioner
8:00 P.M.: Office Gynecology from the Standpoint of the General Practitioner
Dr. Edward A. Schumann, Philadelphia.

April 13, Greensboro: Recent Advances in Etiology and Treatment of Poliomyelitis—Dr. Philip M. Stimson, College of Physicians and Surgeons, Columbia University, New York City (National Foundation for Infantile Paralysis, Co-Sponsor)

Addition to Lumberton Program (This program was announced in the December issue of the **Journal**)
February 25: Management of Functional Disorders in Women—Dr. Emil Novak, University of Maryland, Johns Hopkins University, Baltimore.

News Notes from the Duke University School of Medicine

Course in Medical Mycology

A month's course in medical mycology, under the direction of Dr. Norman F. Conant, is to be offered at the Duke University School of Medicine and Duke Hospital, June 28-July 30, 1948. The course will be offered every day in the week, except Sunday, and has been designed to ensure a working knowledge of the human pathogenic fungi within the time allotted.

Emphasis will be placed on the practical aspects of the laboratory as an aid in helping to establish a diagnosis of fungus infection. Insofar as possible and as patients become available, methods of collecting materials in the clinic for study and culture will be stressed. Work with patients, clinical material, cultures, and laboratory animals will serve as the basis for this course. An opportunity to study pathologic material, gross and microscopic, will be given those whose previous training would allow them to obtain the greatest benefit from a study of such material.

The number of applicants for the course will be limited and the applications will be considered in the order in which they are received. An attempt will be made, however, to select students on the basis of their previous training and their stated need for this type of work.

A fee of $50.00 will be charged for this course, upon the completion of which a suitable certificate will be awarded. Inquiries should be directed to Dr. Norman F. Conant, Duke University School of Medicine, Durham, N. C.

* * * *

Dr. Norman F. Conant, professor of medical mycology, Duke University School of Medicine, has been appointed as a special consultant to the United States Public Health Service as a member of the Bacteriology Study Section. The appointment covers the five-year period from January 1, 1948, to December 31, 1952.

News Notes from the Bowman Gray School of Medicine of Wake Forest College

Dr. Raymond V. Postlethwait assumed his duties as instructor in surgery on January 1, 1948.

* * * *

Dr. Harold D. Green, professor of physiology and pharmacology and director of the department, and Dr. J. Maxwell Little, associate professor of physiology and pharmacology, attended the joint meeting of the American Federation for Clinical Research and the Southern Society for Clinical Research in New Orleans on January 26 and 27. Dr. Green presented a paper entitled "Relationship between Arterial Pressure and Renal Blood Flow." The research work for this paper was carried out by Drs. Green, Ben C. Ogle, J. Maxwell Little, Woodrow Batten, Carlos Rapela, and J. Roy Hege, Jr., and was supported by a grant from the Life Insurance Medical Research Fund. The title of the paper to be presented by Dr. Little is "The Effect of Oral Streptomycin and Phthalylsulfathiazole on Blood Phenol Concentrations and Survival in Experimental Uremia."

Dr. Postlethwait and Dr. George T. Harrell, professor of medicine and director of the Department of Internal Medicine, conducted a medical and surgical seminar at the Kings Mountain Memorial Hospital, Bristol, Tennessee, on January 7 and 8. Dr. Harrell also spoke at the dinner meeting which was held in conjunction with the regular meeting of the Sullivan-Johnson County Medical Society. His subject was "Antibiotics."

* * * *

Dr. Wingate M. Johnson, professor of clinical medicine, spoke on the subject, "Upholding the Prestige of the General Practitioner," at the Grass Roots Conference of County Medical Society Officers, held in conjunction with the interim meeting of the American Medical Association in Cleveland, January 6.

* * * *

Dr. Medford Bowman, Dr. Felda Hightower, and Dr. Robert T. Odom have recently been certified by the American Board of Surgery.

News Notes from the University of North Carolina School of Medicine

The North Carolina Pathology Society held its fall meeting at the School of Medicine, University of North Carolina, on December 5, 1947. The afternoon session was devoted to a seminar dealing with diagnostic problems in histopathology. Dr. K. M. Brinkhous served as moderator. Officers for the coming year were elected as follows: Dr. B. Black-Schaffer, Durham, President; Dr. H. C. Lennon, Greensboro, vice president; Dr. J. C. Reece, Morganton, secretary-treasurer. Dr. Paul Kimmelstiel is the retiring president.

* * * *

Dr. K. M. Brinkhous, professor of pathology at the University of North Carolina, has been appointed special consultant in hematology to the U.S. Public Health Service. Dr. Brinkhous will be a member of the Hematology Study Section, which acts in an advisory capacity in connection with federally supported research projects dealing with studies on the blood.

News Notes from the University of North Carolina School of Public Health

Dr. John J. Wright, professor of public health administration, and Dr. Cecil G. Sheps, assistant professor of public health administration, took part in the conferences of health officers on venereal disease control which were held in December. Dr. Wright addressed the conference of health officers from the eastern part of the state in Durham on December 4, and Dr. Sheps read a paper at the conference of health officers from the western part of the state at Charlotte on December 10.

* * * *

Dr. E. G. McGavran, dean of the School of Public Health, presented a paper on communicable disease control at the meeting of the Mississippi Public Health Association in Jackson, Mississippi, on December 10. Dr. McGavran also conducted a survey of health facilities in Evansville, Indiana, for a two-week period which began December 27.

* * * *

Dr. Bernard Riedel, instructor in parasitology, attended the meeting of the Society of American Parasitologists which was held in Chicago, Illinois, December 29-31.

Tenth District Medical Society

The fall meeting of the Tenth District Medical Society was held in Hendersonville on December 10, Dr. B. O. Edwards of Asheville presiding. Doctors participating on the afternoon program were Dr. J. L. Reeves of Canton; Drs. B. O. Edwards, L. E. Metcalf, Lillie C. Walker, C. A. Hensley, W. M. Russell, W. I. Pendleton, and F. S. Sluder of Asheville; Dr. F. H. Corpening of Hendersonville; Dr. George F. Bond of Chimney Rock; Dr. John Z. Preston of Tryon; and Dr. George Rowe of Marion. Dr. J. Warren White of Greenville, South Carolina, was guest speaker at the dinner meeting.

Dr. D. M. McIntosh of Old Fort and Marion is councilor for the Tenth District. Officers of the society for 1947 were Dr. B. O. Edwards of Asheville, president; Dr. F. O. Trotter of Hendersonville, first vice president; Dr. Harry Miller of Murphy, second vice president; Dr. A. E. Gouge of Bakersville, third vice president; Dr. Harry Ditmore of Marshall, fourth vice president; and Dr. D. M. McIntosh, Jr., of Marion, secretary-treasurer.

Catawba Valley Medical Society

Dr. L. A. Crowell, Jr., of Lincolnton, was elected president of the Catawba Valley Medical Society at its meeting in Lenoir on December 9. He succeeds Dr. L. M. Caldwell of Newton. Dr. E. H. Ellinwood of Hickory was re-elected secretary-treasurer, and Dr. Charles Kendrick of Lenoir was named vice president. Dr. L. N. Glenn of Gastonia was given an honorary membership in the society, and Dr. Julius J. Gibbons of Lenoir was received as a new member.

Guest speaker for the meeting was Dr. George T. Harrell of Winston-Salem.

Edgecombe-Nash Counties Medical Society

Dr. P. P. Poole of Rocky Mount gave a talk on "The Management of Congestive Heart Failure" at the December meeting of the Edgecombe-Nash Counties Medical Society, held in Rocky Mount on December 10. Officers elected for the coming year were Dr. C. W. Bailey of Rocky Mount, president; Dr. W. K. McDowell of Tarboro, first vice president; Dr. O. E. Bell of Rocky Mount, secretary-treasurer; and Dr. S. H. Justa of Rocky Mount, editor. Members of the board of censors are Drs. W. E. Wall, C. T. Smith, and J. G. Raby. Drs. A. L. Daughtridge and C. W. Bailey were elected delegates to the State Society, with Drs. J. H. Cutchin and W. S. Wall as alternates.

Forsyth County Medical Society

Dr. H. Stuart Willis, superintendent and medical director of the North Carolina State Sanatoria, spoke on "Recent Advances in Tuberculosis Control" at the meeting of the Forsyth County Medical Society held in Winston-Salem on January 13.

Officers elected for the coming year were Dr. O. J. Hart, president; Dr. John R. Bender, first vice president; Dr. Charles M. Norfleet, Jr., second vice president; Dr. Charles H. Reid, secretary; and Dr. F. G. Pegg, treasurer.

Halifax County Medical Society

The regular monthly meeting of the Halifax County Medical Society was held in Roanoke Rapids on December 12. A paper on "Treatment of Obesity" and case reports were given by Dr. J. H. Cutchin, Jr., Dr. F. G. Kroncke, and Dr. Farley. Officers elected for 1948 were Dr. F. G. Kroncke, Roanoke Rapids, president; Dr. E. B. Smith, Enfield, vice president; and Dr. M. S. Broun of Roanoke Rapids, secretary-treasurer.

Iredell-Alexander Counties Medical Society

Dr. J. L. Pressly of Statesville was elected president and Dr. Ernest Ward of Statesville secretary of the Iredell-Alexander Counties Medical Society at its December meeting. They succeed Dr. C. L. Bittinger and Dr. L. B. Skeen, both of Mooresville. Drs. James W. Davis and Ross S. McElwee of Statesville were elected delegates to the State Medical Society, with Drs. J. S. Holbrook and Ernest Ward, also of Statesville, as alternates.

Lee County Medical Society

Officers of the Lee County Medical Society for 1948 are Dr. Mary Margaret McLeod of Sanford, president, succeeding Dr. A. A. James, Jr.; Dr. John Dotterer of Sanford, vice president; and Dr. Waylon Blue of Jonesboro, secretary-treasurer.

News Notes

Dr. Verne S. Caviness and Dr. William A. Withers of Raleigh have announced the removal of their office to 109 North Boylan Avenue.

* * * *

Dr. R. B. C. Franklin, a native of Canada and formerly health officer in Surry County, will serve as health officer of Wilson County beginning February 1. Dr. Franklin is a graduate of Queens University in Ontario. During the war he served with the Army Medical Corps and the Office of Strategic Services. He received a Bronze Star for meritorious military service.

* * * *

Dr. Paul W. Johnson of Winston-Salem has announced the reopening of his office, 824 Nissen Building, for the practice of endocrinology and gynecology.

* * * *

Dr. Cristopher Johnston has announced the opening of offices for the practice of internal medicine and electrocardiography at 503 Chestnut Street, Wilmington. Dr. Johnston was formerly associated with the Duke University School of Medicine.

* * * *

Dr. Charles C. Haskell of Richmond, Virginia, president and founder of Charles C. Haskell & Co., Inc., died last month. The firm announces that it will continue in business with the same personnel.

American College of Physicians Research Fellowships in Medicine

Six research fellowships in medicine have been awarded by the American College of Physicians for the year which begins in July, 1948. One of these went to Dr. Samuel P. Martin of Durham, now resident in medicine at Duke Hospital, for studies of bacterial metabolism in the Rockefeller Institute for Medical Research, New York. Another went to Dr. Peritz Scheinberg of Miami, Florida, now assistant resident in medicine at Duke Hospital, for investigation of cerebral circulation and peripheral vascular flow in normal and hypertensive persons. This investigation will be conducted at Duke Hospital under the direction of Dr. Eugene A. Stead.

National Cancer Institute

A million and a half dollars—the largest grant of Public Health Service funds ever to be given at one time—was awarded in December to a total of sixty-four colleges, research laboratories, and public health institutions throughout the country by the National Advisory Cancer Council of the National Cancer Institute, in Bethesda, Maryland.

The Duke University School of Medicine received an award of $24,948 for the development of a teaching program in neoplastic disease.

National Conference on Medical Service

Chicago again plays host to the National Conference on Medical Service on Sunday, February 8. President Creighton Barker, of New Haven, Connecticut, will open the 1948 session in the Red Lacquer Room of the Palmer House at 9:30 a.m. Among those participating on the program is Dr. Wingate Johnson of Winston-Salem.

The American Foundation for Tropical Medicine

The fifth annual presentation of the Richard P. Strong medal for outstanding service in the field of tropical medicine was made to Dr. Neil P. Macphail, veteran surgeon and sanitarian of the United Fruit Company at Quirigua, Guatemala, at the annual dinner of the American Foundation for Tropical Medicine at the Waldorf-Astoria in New York on January 8.

Dr. Thomas T. Mackie of Winston-Salem, president of the Foundation, served as toastmaster.

American Student Health Association

The next meeting of the American Student Health Association will be held in Detroit, May 7 and 8. Dr. Ruth M. Collings of the Woman's College of the University of North Carolina is vice president of the association.

International Poliomyelitis Conference

The National Foundation for Infantile Paralysis will sponsor the First International Poliomyelitis Conference at the Waldorf-Astoria Hotel in New York next July 12 to 17.

The Department of State has been requested to transmit invitations to more than 60 foreign governments to send official delegates to the conference. These officials will be asked to present summarizations of the problems of poliomyelitis in their countries at a special session.

The program will include scientific and technical papers on research and treatment of poliomyelitis to be presented by professional authorities in the field from this country and abroad. In addition, there will be panel discussions on the various subjects.

Industrial Conference on Alcoholism

The first Industrial Conference on Alcoholism will be held in the Morrison Hotel, Chicago, on Tuesday, March 23, 1948.

Sponsored by the Chicago Committee on Alcoholism, the conference has been designed to bring to the attention of industry leaders throughout the country facts pertaining to the problem of alcoholic employees and to discuss ways and means of overcoming the problem.

Reservations for attending the technical sessions and the luncheon may be made by writing Walter O. Cromwell, Vice President, Chicago Committee on Alcoholism, 816 South Halsted Street, Chicago 7, Illinois.

(BULLETIN BOARD CONTINUED ON PAGE 60)

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AUXILIARY

The purpose of the Public Relations Department is the building of a firmer relationship between the medical profession and the public. To accomplish this purpose, our Auxiliary must provide the forceful leadership that is needed to extend to the public at large the aims and ideals, and the health programs, instituted by the American Medical Association. The plan in progress now is singularly adapted to the needs of our own state, and we are cooperating with the Medical Society of the State of North Carolina to develop an adequate medical care program.

The campaign for recruiting student nurses is regarded as a community problem of first importance, and we are aiding in the immediate objective of increasing student enrollment by increasing interest in the nursing profession. One feature of this campaign was the speaking tour of Miss Alice Geraldine Maxwell, "Miss North Carolina Student Nurse of 1947." Miss Maxwell visited nine of the larger cities in the state, and in each of these cities was entertained at an informal tea by the local county auxiliary. Members of the nursing profession and interested high school students and graduates were invited to meet Miss Maxwell and talk over their chosen career.

Other divisions of the medical care program—(1) the promotion of health education, (2) the nutrition program, (3) the program to fight cancer, and (4) the study of prepaid medical care—will require our continuous cooperation. The Public Relations Department will endeavor to bring these health projects to the attention of practically every adult in the state through every possible avenue of approach.

Every community presents many opportunities for leadership in health projects. Throughout the year we have health drives, such as cancer, tuberculosis, and crippled-child relief. All these should be our major concern. The governing boards of associations sponsoring these objectives should have wives of physicians among their members. The Parent-Teachers' Association health chairman needs our assistance and suggestions as she plans her health program. The wife of a physician could serve in no better place than as a Red Cross Chairman, or as a member of the City Health Committee.

Finally, the families of physicians must acknowledge their responsibility to guide and sustain the public relations campaigns designed by our medical leaders.

MRS. MILTON S. CLARK,
Goldsboro
Public Relations Chairman

BOOK REVIEWS

Curare, Its History, Nature, and Clinical Use. By A. R. McIntyre, Ph.D., M.D., Professor of Physiology and Pharmacology, College of Medicine, The University of Nebraska. 240 pages. Price, $5.00. Chicago: University of Chicago Press, 1947.

It is probable that no drug which, according to present-day standards, has therapeutic value possesses a history more abounding in mysticism and romance than curare. The first written accounts of this Indian arrow poison appeared in the latter part of the fifteenth century, and the consternation and awe produced by it in these early Spanish explorers and adventurers are obvious in the quotations translated by the author from the earliest available sources. Dr. McIntyre is to be commended for his scholarly labors in bringing to the reader many fascinating accounts of the early history of curare, and the inevitable legends which arose concerning this mysterious lethal substance.

It was not until the middle of the nineteenth century that curare was given serious consideration as a therapeutic agent. During this time there were reports of its use in tetanus, epilepsy, hydrophobia, and chorea. The drug did not gain wide acceptance, however; its effects were too unpredictable because of the fact that the crude preparations available differed so widely in their potencies.

A standardized preparation of curare alkaloids and one pure alkaloid, d-tubocurarine, have become available in the past few years, and there has been renewed interest in the therapeutic possibilities of this drug. The use of curare to protect patients from injury during shock therapy and as an adjuvant to anesthesia is now well established. Its value in controlling the convulsions of tetanus has been shown although it has not been proved that the mortality from tetanus is reduced by the drug. Its usefulness in chronic spastic states has been investigated.

In this monograph the reader will find a most complete discussion of the history, chemistry, pharmacology, and clinical use of both crude and purified preparations of curare. The many quotations, especially those from sources not readily available, and the extensive bibliography are invaluable to one interested in the subject. Dr. McIntyre writes with the authority of one who has done investigative work on the subject, and he writes in a manner which is quite refreshing.

Anyone who is interested in the borderlands of modern therapeutics or in pharmacology or physiology, will find in this monograph a fascinating account of our knowledge of curare. If, in addition, the reader is appreciative of a scholarly approach to a subject, he will find here much that will please him.

Symptoms and Signs in Clinical Medicine By E. Noble Chamberlain, M.D., M.Sc., F.R.C.P.; Lecturer in Medicine, University of Liverpool. Ed. 4. 463 pages, with 346 illustrations, 19 in color. Price, $8.00. Baltimore and London: Williams and Wilkins, 1947.

This represents the fourth edition of a book first published in 1936. Many sections have been revised, particularly the chapters on the nervous system which now form almost a fourth of the present volume.

The author and his collaborators attempt to integrate for the student signs and symptoms with differential diagnosis. Unfortunately they often seem to expect their readers to have had some previous clinical background.

Each chapter begins with a discussion of symptoms referable to the system being discussed and proceeds to a discussion of normal and abnormal findings, often mixing the two with considerable repetition. While there is a chapter on "Clinical Pathology and Biochemistry" bits of laboratory information and examinations are scattered throughout the book; for example, the special characteristics of various types of sputum are included in the chapter on respiratory disease and are placed in the discussion of symptoms.

Often, as in the section on "Medical Operations and Instrumental Investigation," the attempts to be inclusive have resulted in marked inadequacies. Such sections will be of little value in enabling the reader to carry out the procedures described.

This book is not recommended as a student text for physical diagnosis. It might be of value to students or practitioners interested in a brief review of the subject.

Paravertebral Block in Diagnosis, Prognosis and Therapy. By Felix Mandl, Professor of Surgery, Hadassah University Hospital, Jerusalem. Translated by Gertrude Kallner, M.D. 330 pages. Price, $6.50. New York: Grune & Stratton, Inc., 1947.

This monograph on paravertebral block is divided into two parts. In the first part the author discusses the anatomy, technique, object and theory of the method. In part two, the use of the technique in differential diagnosis and therapy of abdominal disorders, cardiovascular diseases, and disorders of the extremities is discussed.

One can scarcely agree with all of the author's opinions and conclusions regarding the uses of paravertebral block, particularly as applied to the differential diagnosis and treatment of various types of abdominal pain.

The style of the text has doubtless suffered some in the translation, and the author is at times overly enthusiastic or unjustifiably dogmatic. Nevertheless, the volume impresses the reader as the author's honest appraisal of a technique whose value and place in medicine are poorly defined because it has been so widely used in treating conditions which are poorly defined.

It is opportune that this volume should appear at a time when Etamon and Priscol are being introduced. It will be most interesting to observe the effects which use of these drugs will have on the concepts discussed in this book.

The book should prove valuable to a wide variety of physicians, because paravertebral block is potentially useful in such a wide variety of disorders extending into almost all specialties in medicine.

Rypins' Medical Licensure Examinations. Edited by Walter L. Bierring, M.D., F.A.C.P., M.R.C.P., Edin. (Hon.), secretary, Federation of State Medical Boards of the United States. Ed. 6. 690 pages. Price, $6.00. Philadelphia: J. B. Lippincott Co., 1947.

This book is a revised and modernized edition of the volume originally published in 1933. It has been brought up to date by a rather impressive group of contributors who are recognized authorities in their particular fields.

Medical licensure examinations have become more general in the coverage of subject matter. The text of the book therefore consists of general discussions of the various basic sciences and clinical fields of medicine. This method of presentation makes the book of value not only to those preparing for licensure examinations, but to anyone interested in a review of the basic principles in any of the divisions of medicine included.

At the close of each section there is a list of typical state board questions, which aids the reader in evaluating what he has gained from the preceding section. The discussions are clearly written and easy to read, and the book appears to be adequately indexed.

The only criticism which this reviewer has to offer is that the discussions of controversial matters do not always present more than one side of the issue.

In general the book is recommended for the purpose for which it was intended.

Morphologic Hematology. Special Issue No. 1 of **Blood, The Journal of Hematology.** Edited by William Dameshek. Price, $3.75. New York: Grune & Stratton, Inc., July, 1947.

The growth and development of morphologic hematology are traced briefly in the introduction of this issue. It is pointed out that, while hematology began as morphology, most of the major morphologic contributions were made prior to 1924. Since that time hematologists have been far more interested in the physiopathologic and chemical aspects of the blood than in purely cytologic study. With the more recent development of various histochemical techniques such as phase microscopy, however, morphology is once again making an active and interpretative contribution to the field of hematology.

This special issue of **Blood** contains eighteen articles which are primarily of interest to the hematologist and hematologic technician. Although it deals chiefly with morphologic studies and techniques, it is not a review of the recent work and status of morphologic hematology, but is rather a supplement to the rapidly expanding volume of hematologic study currently appearing in the regular issues of this journal.

Some of the various techniques described open up new and promising avenues of investigation. That certain of these will have clinical application in the not-too-distant future is suggested, for example, by the **in vitro** studies of bone marrow and its response to various stimulating substances such as liver extract and plasma; the apparent correlation between the phagocytic activity of anemic blood and resistance to infection; and the platelet-agglutination studies which may well lead to a clearer concept of blood coagulation and the etiology of thrombotic and hemorrhagic disorders.

A Textbook of Clinical Neurology, with an Introduction to the History of Neurology. By Israel S. Wechsler, M.D., Clinical Professor of Neurology, Columbia University, N. Y.; Neurologist, The Mt. Sinai Hospital; Consulting Neurologist, Montefiore Hospital and Rockland State Hospital, N. Y. Ed. 6. 829 pages with 162 illustrations. Price, $8.50. Philadelphia and London: W. B. Saunders Company, 1947.

Although the sixth edition of Wechsler's **Textbook of Clinical Neurology** has been modified slightly, the changes have been minimal and the book is essentially the same as the previous edition. The most outstanding change has been the addition of a small section dealing with psychologic diagnosis. This section replaces the section on psychometric tests included in the previous edition.

This book has been a standard text of neurology for many years. It includes adequate descriptions of all the important neurologic conditions. The approach is primarily descriptive, and there is a tendency for the author to emphasize signs and symptoms rather than etiology and pathologic physiology.

This volume must certainly be considered adequate for a student textbook in neurology, but it could scarcely be considered as a reference text on the subject.

Sexual Behavior in the Human Male. By Alfred C. Kinsey, Professor of Zoology, Indiana University; Wardell B. Pomeroy, Research Associate, Indiana University; and Clyde E. Martin, Research Associate, Indiana University. 804 pages, with 173 charts and 159 tables. Price, $6.50. Philadelphia and London: W. B. Saunders Company, 1948.

This volume represents the first scientific approach to the study of a fundamental life process. The approach is the objective biologic one which examines man as a species of animal. The alterations in his sexual behavior induced by civilization —particularly the habits, customs and education of the individual—are studied, and the facts are applied to the sociologic study of man. Since the results are found to be colored so much by the background of the individual and since only men of this country have been questioned, the study might better be titled "Sexual Behavior in the American Male."

The factual data were accumulated by thousands of personal interviews. Several interesting conclusions are drawn which are at variance with the accepted impressions. There is a great difference in the reaction and habits of men of different educational levels; the differences between those of grade school and college training are quite striking. They become apparent even before the men mature and are reflected in early experiences before college age. These findings must reflect the individual's home background and environment as much as his educational opportunities. Though men of grade-school education have much more sexual experience before and in the early years of marriage, they tend to become more monogamous as the years go on; the exact reverse is true of college men.

The study examines the total sexual outlet of the man and throws into perspective several problems. Masturbation, nocturnal emission, petting, and intercourse are all considered as forms of sexual outlet. The effect of each of these on the subsequent marital adjustment is examined. It is concluded that the sex habits of the modern American male have changed little from those of preceding generations. The prostitute is less of a problem than one would judge from fiction and from the venereal disease control programs. The problems of homosexuality and of animal contacts are greater than generally recognized. The authors conclude that the degree of petting indulged in by the current young generation has not increased promiscuity and premarital intercourse, but has served as a substitute outlet for sexual emotions. Need for considerable thought on the question of what constitutes sexual perversion is indicated. The study indicates that oral-genital contact is sufficiently frequent to be considered a normal accompaniment of mating.

The facts uncovered by this study deserve careful consideration by those who make and enforce laws. Social workers and clinicians should find the book of aid in interpreting the normality of patterns in individuals whom they see professionally. Many questions raised are left unanswered, but further study of the data is in progress. Future study will doubtless give the answer to the other half of the problem—the sexual behavior of the female.

Practical Child Guidance and Mental Hygiene. By Samuel Kahn, M.D., Ph.D., Grace Kirsten, A.B., and May Elish March, A.B., M.A. 285 pages. Price, $4.00. Boston: Meador Publishing Company, 1947.

This book falls far short of its goal of being a "good book on Child Guidance." It is written in the Socratic question-answer form. The answers are brief, extremely dogmatic, and often inadequate. In trying to be practical the authors dispense advice which is potentially dangerous if taken seriously. Several questions picked at random illustrate this point:

"My child never wants to play. She is always studying and working. What might her trouble be?" The recommended course of action is: "This asocial behavior should not be permitted because it may be the early symptom of schizophrenia." There is not a word about the solution of the trouble which is causing this child's presumably abnormal reactions.

"I have a seven and a half year old son who protects his three and a half year old brother against others. At home, however, he calls him stupid and says, 'You are dead.' How should I handle them?" This question is answered by a four-sentence paragraph in which the parent is advised what to tell the older son! There is no mention of the feelings of parental rejection causing the exhibition of antagonism toward his brother, and no advice to the parents about remedying these feelings of rejection.

Preceding each chapter there is a short introductory discussion of the problems to be taken up. These discussions are good as far as they go. It is hoped that in future editions these sections will be expanded, and the question-and-answer sections greatly curtailed or eliminated.

Twentieth Anniversary Year of Harofe Haivri The Hebrew Medical Journal

The attention of the medical profession is directed to the appearance of the Fall issue of **Harofe Haivri (The Hebrew Medical Journal)**, a semi-annual bilingual publication edited by Moses Einhorn, M.D.

In the medical section, the following subjects are offered: "The Importance of the Rh Factor in Clinical Medicine" by Philip Levine, M.D., and "Pharmacology and Toxicology of Streptomycin" by Ernst Pick, M.D.

The original articles are summarized in English to make them available to those who are unable to read Hebrew. The editorial office of The Hebrew Medical Journal, 983 Park Avenue, New York 28, N. Y., will be glad to furnish any further information desired.

BULLETIN BOARD

(CONTINUED FROM PAGE 56)

International Surgical Assembly

The Sixth International Assembly of the International College of Surgeons will be held in Rome, Italy, at the invitation of the Italian Government, during the week of May 16-23, 1948. Attendance is not limited to the members of the College; all surgeons in good standing in their medical organizations are invited. Scientific meetings, scientific and commercial exhibits, visits to the Universities of Turin and Milan have been arranged, together with tours to other medical centers in Europe. Detailed information may be obtained from Dr. Max Thorek, General Secretary, 850 Irving Park Road, Chicago 13. For travel information, address the All Nations Travel Bureau, 38 S. Dearborn Street, Chicago, the official travel representatives for this Assembly.

Pharmaceutical-Medical Research Foundation

The following announcement was made by Dr. Morris Fishbein, Editor of the **Journal of the American Medical Association**, at the Scientific Award Ceremony by the American Pharmaceutical Manufacturers' Association in honor of the American Medical Association, held at the Waldorf-Astoria in New York on December 16.

"A committee has been organized to establish a new foundation for basic medical research, to improve the public health. It is a committee of representatives from the pharmaceutical (including the medicinal chemical) industry and the medical profession.

"The representatives from the pharmaceutical industry are Mr. S. DeWitt Clough, Chairman of the Board, Abbott Laboratories; Mr. A. H. Fiske, Vice President, Eli Lilly and Company; Mr. Elmer H. Bobst, President, William R. Warner & Co., Inc.; Mr. John L. Smith, President, Chas. Pfizer & Co., Inc.; Mr. S. Barksdale Penick, Jr., President, S. B. Penick & Co.; Mr. M. C. Eaton, President, Norwich Pharmacal Co.; and Mr. Charles Wesley Dunn, of the New York Bar. The representatives from the medical profession are the following officers of the American Medical Association: Dr. R. L. Sensenich, President-Elect; Dr. E. L. Henderson, Chairman of the Board of Trustees; Dr. Ernest E. Irons, Secretary of the Board of Trustees; Dr. Morris Fishbein, Editor of the Journal; and Dr. Austin Smith, Secretary of the Council on Pharmacy and Chemistry. Dr. Sensenich is chairman of the committee.

"This foundation is an historic development, because it is the first joint action by the pharmaceutical industry and medical profession in such an organization for basic medical research. Therefore it will be named **The Pharmaceutical-Medical Research Foundation.** And it will be financially supported, in major part, by the pharmaceutical industry, as a contribution to the national welfare.

"The foundation will be a wholly public institution in purpose, conduct and service. Its governing board will include distinguished and appropriate representatives of the general public, in addition to leading representatives of the pharmaceutical industry and medical profession. The board will determine its program of scientific research, on the basis of a recommendation by an authoritative scientific advisory committee and the advice of an eminent scientific director. It is contemplated that the initial basic research by the foundation will be in the field of the degenerative diseases, where there is an urgent need for it."

Veterans Administration

Veterans Administration has announced that **prima facie** evidence will not be accepted as sufficient proof for veterans to establish service-connection for medical and dental treatment after December 31, 1947. On this date, veterans had had a full year after the President announced the end of hostilities in which to secure treatment on the presumption of service-connection, based on **prima facie** evidence.

Applications for treatment mailed after December 31 will have to be formally adjudicated under the regulations before treatment other than emergency can be given.

This ruling in no way affects the year's presumption of service-connection to which all veterans are entitled after discharge.

Postgraduate Course in Diseases of the Chest

The American College of Chest Physicians, Pennsylvania Chapter, and the Laennec Society of Philadelphia are sponsoring a postgraduate course in diseases of the chest to be held during the week of March 15-20, 1948, at the Warwick Hotel, Philadelphia, Pennsylvania.

The emphasis in this course will be placed on the newer developments in all aspects of diagnosis and treatment of diseases of the chest.

The course will be limited to 30 physicians. Tuition fee is $50.00 for members, and $90.00 for nonmembers.

Further information may be secured at the office of the American College of Chest Physicians, 500 North Dearborn Street, Chicago 10, Illinois.

Postgraduate Course in Physical Medicine and Rehabilitation

The University of Texas, Medical Branch, announces a postgraduate course in Physical Medicine and Rehabilitation to be held in Galveston, March 1-5, 1948. The course is designed for the general practitioner and specialist interested in the more effective use of physical medicine.

Those planning to attend are requested to register in advance with Dr. T. G. Blocker, Director of Postgraduate Study. A tuition fee of $25.00 for physicians and administrators and $15.00 for registered technicians will be charged. An additional $2.00 fee will be charged those desiring certification of attendance at the course.

Those desiring further information regarding the course should write Dr. W. A. Selle, Director of Postgraduate Course in Physical Medicine, University of Texas, Medical Branch, Galveston, Texas.

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